component catalog

Made With Pride in the USA

hollaender.com

Hollaender
Your Handrail Source.

Index

page

Slip-On Fittings

Hollaender®

The Hollaender® Advantage

- **Speed of Installation** – Studies have shown significant cost savings when compared to the cost of welded handrail and other structures
- **Ease of Installation** – Only tools required are a saw, hex key and tape measure
- **Flexibility** – Aluminum magnesium cast fittings can be used with aluminum, galvanized steel, stainless steel and black iron pipe
- **Reusability** – Structures fabricated with Hollaender® fittings can easily be disassembled and reconfigured
- **Strength** – Railing systems can be designed using standard Hollaender® products to meet any building code. Please refer to Technical Section of Catalog, www.hollaender.com, or call our engineers.
- **Time Tested** – Products are backed by over 60 years of experience

Applications are limited only by the imagination

Handrails & guardrails, playgrounds and carts, store fixtures, offshore petro/chemical, industrial plants, racking systems, warehouses, health & medical buildings, portable structures, recreational areas, amusement parks, film industry, government facilities & public works, displays, and much, much more.

Typical Hollaender® Slip-On Fittings

Hollaender® features the World's best known brands

Speed-Rail® – Inline design has become the benchmark for quality throughout the industry.

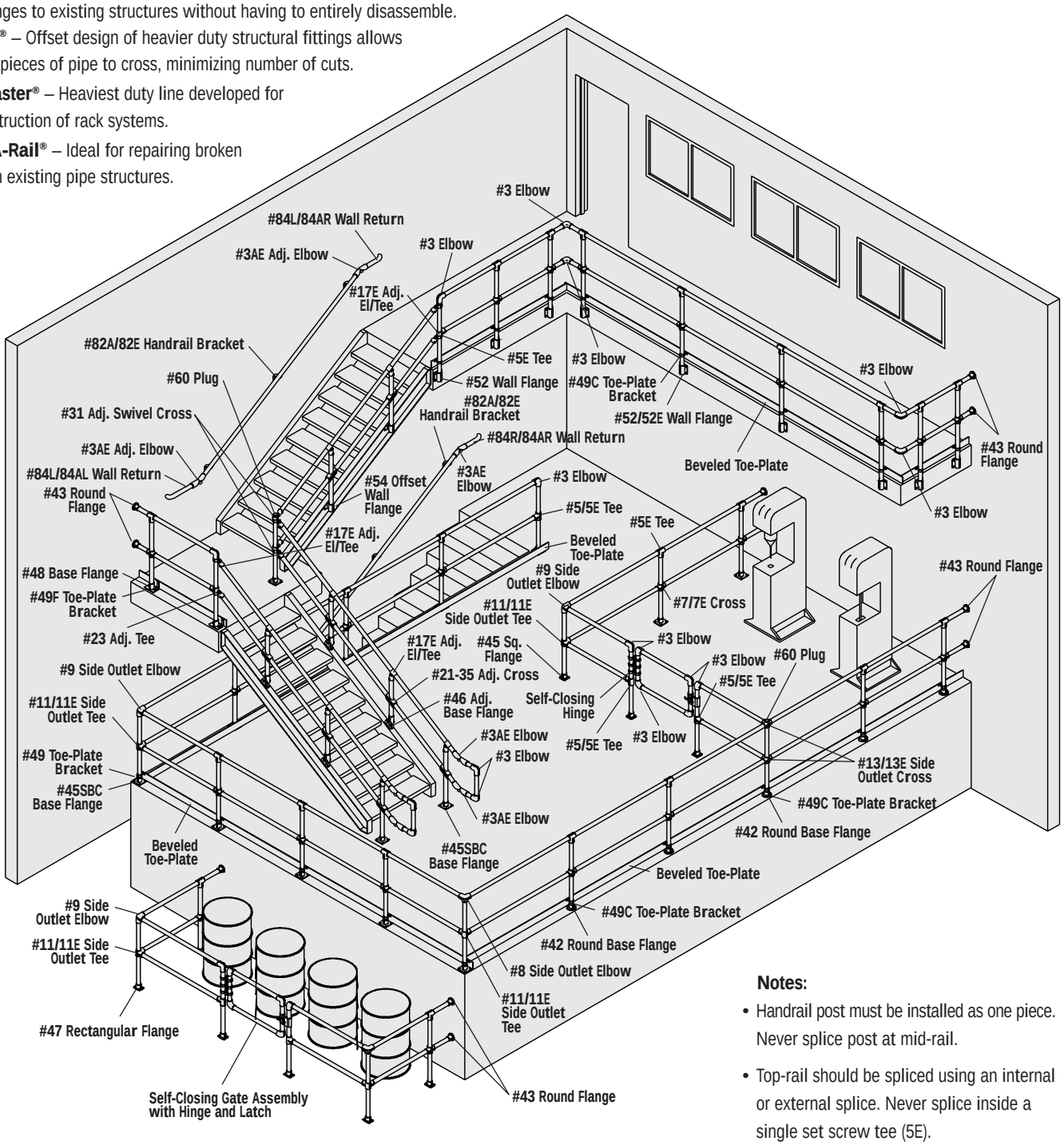
Speed-Rail® II – Patented modular fitting system which easily allows for additions and changes to existing structures without having to entirely disassemble.

Nu-Rail® – Offset design of heavier duty structural fittings allows multiple pieces of pipe to cross, minimizing number of cuts.

Rackmaster® – Heaviest duty line developed for the construction of rack systems.

Mend-A-Rail® – Ideal for repairing broken welds on existing pipe structures.

Hollaender® products are produced from only the highest quality materials such as Aluminum Alloy 535, the most corrosive resistant alloy available today, and feature proprietary fasteners that have tremendous slip and loosening resistance.



Notes:

- Handrail post must be installed as one piece. Never splice post at mid-rail.
- Top-rail should be spliced using an internal or external splice. Never splice inside a single set screw tee (5E).

No. 2S Modular Tee	I.P.S. Size	Item Number
	3/4"	15000
	1"	16000
	1-1/4"	17000
	1-1/2"	18000
	Components: (1) No. 99C, (1) No. 2SB	

No. 3 Elbow	I.P.S. Size	Item Number
	3/4"	05020
	1"	06020
	1-1/4"	07020
	1-1/2"	08020
	2"	09020

No. 3AE Adjustable Elbow	I.P.S. Size	Item Number
	1-1/4"	07030
	1-1/2"	08030

No. 5 Tee	I.P.S. Size	Item Number
	3/4"	05040
	1"	06040
	1-1/4"	07040
	1-1/2"	08040
	2"	09040

No. 5AT Angle Tee (55°)	I.P.S. Size	Item Number
	3/4"	05050
	1"	06050
	1-1/4"	07050

No. 5E Tee-E	I.P.S. Size	Item Number
	3/4"	05060
	1"	06060
	1-1/4"	07060
	1-1/2"	08060

No. 5EXT Extended Barrel Tee	I.P.S. Size	Item Number
	1-1/2"	08110

No. 5SR Tee Side Rib	I.P.S. Size	Item Number
	1-1/2"	08070
	2"	09070

No. 6 Angle Tee (45°)	I.P.S. Size	Item Number
	1-1/4"	07080
	1-1/2"	08080

No. 7 Cross	I.P.S. Size	Item Number
	3/4"	05090
	1"	06090
	1-1/4"	07090
	1-1/2"	08090
	2"	09090

Hollaender

No. 7E Cross-E	I.P.S. Size	Item Number
	3/4"	05100
	1"	06100
	1-1/4"	07100
	1-1/2"	08100

No. 11E Side Outlet Tee-E	I.P.S. Size	Item Number
	3/4"	05150
	1"	06150
	1-1/4"	07150
	1-1/2"	08150

No. 7S Modular Cross Assembly	I.P.S. Size	Item Number
	1-1/2"	18020

Components: (1) No. 7SB
(1) No. 2SB

No. 12 Short Barrel Cross	I.P.S. Size	Item Number
	3/4"	05160
	1"	06160
	1-1/4"	07160
	1-1/2"	08160

No. 9 Side Outlet Elbow	I.P.S. Size	Item Number
	3/4"	05120
	1"	06120
	1-1/4"	07120
	1-1/2"	08120
	2"	09120

No. 13 Side Outlet Cross	I.P.S. Size	Item Number
	3/4"	05170
	1"	06170
	1-1/4"	07170
	1-1/2"	08170

No. 10 Offset Cross	I.P.S. Size	Item Number
	3/4"	05130
	1"	06130
	1-1/4"	07130
	1-1/2"	08130
	2"	09130

No. 13E Side Outlet Cross-E	I.P.S. Size	Item Number
	1"	06180
	1-1/4"	07180
	1-1/2"	08180

No. 11 Side Outlet Tee	I.P.S. Size	Item Number
	3/4"	05140
	1"	06140
	1-1/4"	07140
	1-1/2"	08140
	2"	09140

No. 14S Modular Offset Cross Assembly	I.P.S. Size	Item Number
	1"	16040
	1-1/4"	17040
	1-1/2"	18040

Components: (1) No. 99C
(1) No. 14SB

No. 15 Nu-Rail Offset Tee	I.P.S. Size	Item Number
	1-1/4"	07210

No. 16 Bolt-On Tee	I.P.S. Size	Item Number
	1-1/4"	07220
	1-1/2"	08220

No. 17 Adj. Elbow or Tee Assembly	I.P.S. Size	Item Number
	3/4"	05230
	1"	06230
	1-1/4"	07230
	1-1/2"	08230
	2"	09230

No. 17A Adjustable Elbow 180°	I.P.S. Size	Item Number
	3/4"	05290
	1"	06290
	1-1/4"	07290
	1-1/2"	08290

No. 17E Adj. Elbow or Tee-E Assembly	I.P.S. Size	Item Number
	3/4"	05240
	1-1/4"	07240
	1-1/2"	08240

No. 17EM Adj. Elbow or Tee-E Male Body	I.P.S. Size	Item Number
	3/4"	05250
	1-1/4"	07250
	1-1/2"	08250

No. 17EMO Adj. Ell or Tee Male/Oval Slot	I.P.S. Size	Item Number
	1-1/2"	08260

No. 17F Adj. Elbow or Tee Female Body	I.P.S. Size	Item Number
	3/4"	05270
	1"	06270
	1-1/4"	07270
	1-1/2"	08270
	2"	09270

No. 17HM Hook	Size	Number
	1-1/4"	07490
	1-1/2"	08490

No. 17M Adj. Elbow or Tee Male Body	I.P.S. Size	Item Number
	3/4"	05280
	1"	06280
	1-1/4"	07280
	1-1/2"	08280
	2"	09280

Hollaender

No. 17MA Extended Tab	I.P.S. Size	Item Number
	1-1/2"	08390

No. 17S Modular Adj. Tee Assembly	I.P.S. Size	Item Number
	1-1/2"	18060

Components: (1) No. 98C
(1) No. 17SB
(1) No. 17F

No. 18S Modular Stair Bracket Assembly	I.P.S. Size	Item Number
	1-1/2"	18100

Components: (1) No. 99C
(1) No. 18SB

No. 19 Adj. Cross Assembly	I.P.S. Size	Item Number
	3/4"	05330
	1"	06330
	1-1/4"	07330
	1-1/2"	08330
	2"	09330

No. 19E Adj. Cross-E	I.P.S. Size	Item Number
	1-1/2"	08300

No. 19EM Adj. Cross Male Body-E	I.P.S. Size	Item Number
	1-1/2"	08310

No. 19EMO Adj. Cross Male-E/Oval Slot	I.P.S. Size	Item Number
	1-1/2"	08320

No. 19M Adj. Cross Male Body	I.P.S. Size	Item Number
	3/4"	05340
	1"	06340
	1-1/4"	07340
	1-1/2"	08340
	2"	09340

No. 19MA Double Extended Tab	I.P.S. Size	Item Number
	1-1/2"	08970

No. 20 Outside Corner	I.P.S. Size	Item Number
	1"	06350
	1-1/4"	07350
	1-1/2"	08350
	2"	09350

No. 21-35 Adj. Cross (10°-35°)

I.P.S. Size	Item Number
1"	06360
1-1/4"	07360
1-1/2"	08360
2"	09360

No. 21-45 Adj. Cross (30°-45°)

I.P.S. Size	Item Number
3/4"	05370
1"	06370
1-1/4"	07370
1-1/2"	08370

No. 22S Mod. Cross Elbow Assembly

I.P.S. Size	Item Number
1-1/4"	17120
1-1/2"	18120

Components: (1) No. 99C
(1) No. 22SB

No. 23 Adj. Tee or Cross

I.P.S. Size	Item Number
3/4"	05400
1"	06400
1-1/4"	07400
1-1/2"	08400

No. 23M Adj. Tee or Cross Male

I.P.S. Size	Item Number
3/4"	05410
1"	06410
1-1/4"	07410
1-1/2"	08410

No. 23S Modular Adj. Cross

I.P.S. Size	Item Number
1-1/2"	18140

Components: (1) No. 2SB
(1) No. 17SB
(1) No. 17F

No. 25 Side Outlet Adj. Elbow or Tee

I.P.S. Size	Item Number
3/4"	05420
1"	06420
1-1/4"	07420
1-1/2"	08420

No. 25M Adj. Side Outlet Ell or Tee Male

I.P.S. Size	Item Number
3/4"	05430
1"	06430
1-1/4"	07430
1-1/2"	08430

No. 27 Dbl. Adj. Side Outlet Ell or Tee Assem.

I.P.S. Size	Item Number
3/4"	05440
1"	06440
1-1/4"	07440
1-1/2"	08440

No. 27E Dbl. Adj. Side Outlet Tee-E

I.P.S. Size	Item Number
1-1/2"	08460

Hollaender

No. 27EM Dbl. Adj. Side Outlet Tee-E Male	I.P.S. Size	Item Number
	1-1/2"	08470

No. 27EMO Dbl. Adj. Side Outlet Tee Male	I.P.S. Size	Item Number
	1-1/2"	08480

No. 27M Dbl. Adj. S.O. Ell or Tee Male Body	I.P.S. Size	Item Number
	3/4"	05450
	1"	06450
	1-1/4"	07450
	1-1/2"	08450

No. 28S Mod. Corner Ell (1 Barrel) Assem.	I.P.S. Size	Item Number
	1-1/4"	17150
	1-1/2"	18150

Components: (1) No. 99C
(1) No. 28SB

No. 29-7 Adjustable Side Outlet Elbow	I.P.S. Size	Item Number
	1-1/4"	07570

No. 30 Nu-Rail Adj. Cross	I.P.S. Size	Item Number
	3/4"	05500
	1"	06500
	1-1/4"	07500
	1-1/2"	08500
	2"	09500

Components: (1) 30A
(1) 30B

No. 30-A Nu-Rail Modified Cross	I.P.S. Size	Item Number
	3/4"	05510
	1"	06510
	1-1/4"	07510
	1-1/2"	08510
	2"	09510

No. 30-B Nu-Rail Swivel	I.P.S. Size	Item Number
	3/4"	05520
	1"	06520
	1-1/4"	07520
	1-1/2"	08520
	2"	09520

No. 30-C Nu-Rail Adj. Swivel	I.P.S. Size	Item Number
	3/4"	05530
	1"	06530
	1-1/4"	07530
	1-1/2"	08530
	2"	09530

End caps not included

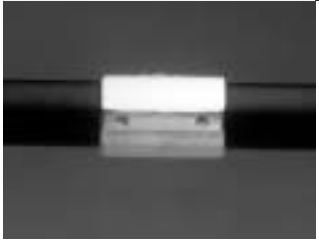
No. 31 2-Dimensional Adj. Cross	I.P.S. Size	Item Number
	1-1/2"	08540

No. 60 Plug Sch. 40 (O.D. Fitting)	I.P.S. Size	Item Number
	3/4"	05600
	1"	06600
	1-1/4"	07600
	1-1/2"	08600
	2"	09600

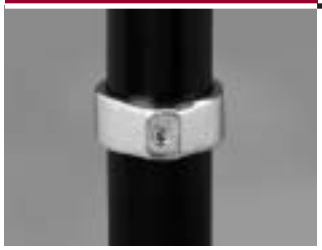
No. 62 Plug Sch. 40 (O.D. Pipe)	I.P.S. Size	Item Number
	3/4"	05610
	1"	06610
	1-1/4"	07610
	1-1/2"	08610

No. 62P Plastic Plug Sch. 40	I.P.S. Size	Item Number
	3/4"	71501
	1"	71502
	1-1/4"	71500
	1-1/2"	71503
	2"	71504

No. 65 Plug Sch. 80 (O.D. Pipe)	I.P.S. Size	Item Number
	1-1/4"	07620
	1-1/2"	08620
	2"	09620

No. 70 External Coupling	I.P.S. Size	Item Number
	3/4"	05630
	1"	06630
	1-1/4"	07630
	1-1/2"	08630
	2"	09630

No. 70S Modular External Coupling	I.P.S. Size	Item Number
	1-1/2"	18170
	Components: (1) No. 99C (1) No. 98C	

No. 78 Short Collar	I.P.S. Size	Item Number
	1-1/4"	07680
	1-1/2"	08680

No. 78I	I.P.S. Size	Item Number
	1-1/4"	07690
	1-1/2"	08690
	2"	09690

No. 94 Double Tab Bracket – Oval Slot	Size	Number
	1-1/2"	08780

No. 95 Single Tab Bracket – Oval Slot	Size	Number
	1-1/2"	08790

Hollaender

No. 96 Platform Bracket	I.P.S. Size	Item Number
	1-1/2"	08720

No. 98C Modular Cap Female	I.P.S. Size	Item Number
	1-1/2"	18180

No. 99C Modular Cap Male	I.P.S. Size	Item Number
	3/4"	15190
	1"	16190
	1-1/4"	17190
	1-1/2"	18190

No. 100 Rackmaster	I.P.S. Size	Item Number
	1"	06730
	1-1/4"	07730
	1-1/2"	08730

No. 102 Rackmaster	I.P.S. Size	Item Number
	1"	06740
	1-1/4"	07740
	1-1/2"	08740
	2"	09740

No. 104 Side Outlet Cross	I.P.S. Size	Item Number
	3/4"	05750
	1"	06750
	1-1/4"	07750
	1-1/2"	08750

No. 104S Modular Side Outlet Cross	I.P.S. Size	Item Number
	3/4"	15240
	1"	16200

No. 106 Dbl. Side Outlet Cross	I.P.S. Size	Item Number
	3/4"	05760
	1"	06760
	1-1/4"	07760
	1-1/2"	08760

No. 106E Dbl. Side Outlet Cross-E	I.P.S. Size	Item Number
	1"	06770
	1-1/4"	07770
	1-1/2"	08770

No. 150-8 Speed Tee	Size	ItemNumber
	1-1/2"	58500

No. 151-8 Adjustable Speed Tee	Size	ItemNumber
	1-1/2"	58510

No. 300 Mend-A-Rail Elbow	I.P.S. Size	Item Number
	1-1/2"	38800

No. 500 Mend-A-Rail Tee	I.P.S. Size	Item Number
	1-1/2"	38810

No. 700 Mend-A-Rail Cross	I.P.S. Size	Item Number
	1-1/2"	38860

No. 1700 Mend-A-Rail Adj. Ell or Tee	I.P.S. Size	Item Number
	1-1/2"	38820

No. 1900 Mend-A-Rail Cross Adj.	I.P.S. Size	Item Number
	1-1/2"	38830

No. 2500 Mend-A-Rail Side Outlet Ell/Tee	I.P.S. Size	Item Number
	1-1/2"	38840

No. 7000 Mend-A Rail Coupling	I.P.S. Size	Item Number
	1-1/2"	38850

Flanges

Hollaender® offers an extensive line of flanges for mounting handrail, guardrail, and other pipe structures. These flanges are available in optional finishes. Selecting the right flange becomes extremely important in all handrail applications. To aid in the selection process, please refer to the chart on the following page and dimensional drawings on the subsequent pages.

Our engineering staff is available to answer questions regarding the appropriate hardware. Concrete anchors and machined bolts may be ordered to complete the handrail system. Many applications require toeplate. (Refer to Tech Information section, Building Codes and OSHA standard pipe railing for requirements.)

Refer to our Accessories section for our toeplate and toeplate brackets. Please refer to our web page at www.hollaender.com for additional technical support.

Base Flange Selection Guide for Handrail Applications

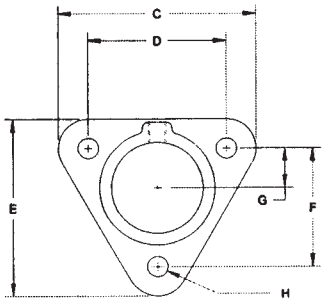
1-1/2" Mounting Flange	OSHA only or 4' Post Spacing	IBC/ UBC 5' Post Spacing	IBC/ UBC 6' Post Spacing	S.B.C. 5' Post Spacing	S.B.C. 6' Post Spacing	B.O.C.A. 5' Post Spacing	B.O.C.A. 6' Post Spacing	Wall Mount Only Non-Structural	ADA Ramp 5' Post Spacing	USACE EM385-1-1
#40								●		
#41								●		
#42	●									
#43								●		
#45	●									
#45SBC	●	●	●	●	●	●	●		●	●
#45SBCS									●	●
#46	●	●		●		●				
#46ADJ*	●									
#46AF	●	●	●	●	●	●	●			
#47	●									
#48	●	●	●	●	●	●	●			●
#48BC	●	●	●	●	●	●	●			●
#50	●	●		●		●				
#52	●	●	●	●	●	●	●			●
#52E	●	●	●	●	●	●	●			●
#54-3-4-5	●	●	●	●	●	●	●			●

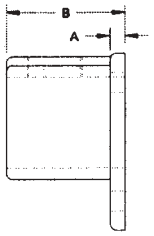
● Surface Mount Flange ● Side Mount Flange ● Non-Structural Flange

Information shown above should be considered only as a guide, not a recommendation. Data used to develop this chart does not take pipe materials or mounting hardware into consideration. Both factors will greatly affect the overall performance of a handrail system.

*Stair handrail only - 36" maximum height

No. 40 Triangular Flange

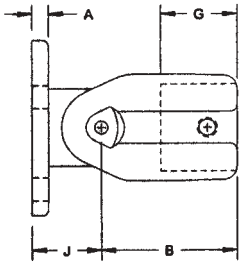


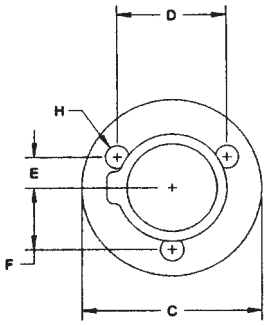


I.P.S. Size	Item Number	A	B	C	D	E	F	G	H	J
3/4"	25010	3/16"	1-1/2"	2-1/2"	1-3/4"	2-1/4"	1-1/2"	1/2"	5/16" Ø	–
1"	26010	1/4"	1-3/4"	3-3/16"	2-5/16"	2-7/8"	2"	11/16"	5/16" Ø	–
1-1/4"	27020	1/4"	1-3/4"	3-7/8"	2-5/8"	3-1/2"	2-1/4"	3/4"	7/16" Ø	–
1-1/2"	28020	5/16"	2-1/2"	4-3/16"	2-15/16"	3-13/16"	2-9/16"	7/8"	7/16" Ø	–

No. 41 Adj. Flange (Wall Only)

No. 41M Flange Base

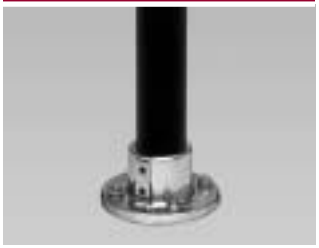


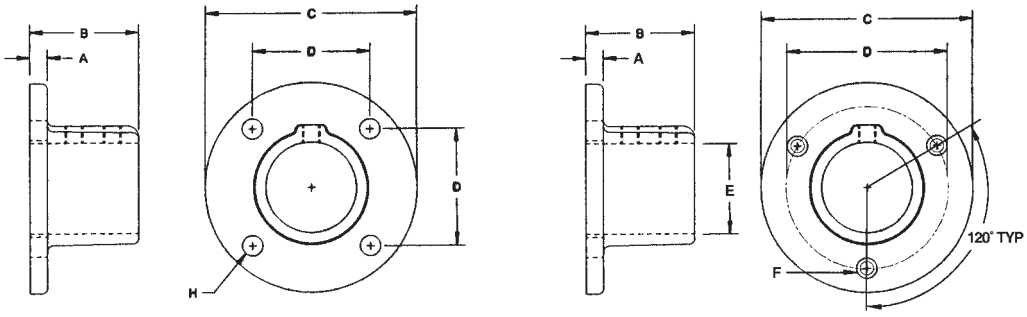


I.P.S. Size	Item Number	A	B	C	D	E	F	G	H	J
3/4"	25040	1/4"	1-15/16"	2-7/8"	1-5/8"	15/32"	15/16"	31/32"	5/16" Ø	1-3/16"
1"	26040	1/4"	2"	2-7/8""	1-5/8"	15/32"	15/16"	1-3/16"	5/16" Ø	1-3/16"
1-1/4"	27050	5/16"	2-1/2"	3-3/8"	2-1/16"	19/32"	1-3/16"	1-9/16"	7/16" Ø	1-5/16"
1-1/2"	28050	5/16"	2-13/16"	3-3/8"	2-1/16"	19/32"	1-3/16"	1-11/16"	7/16" Ø	1-5/16"

No. 41M Flange Base	
3/4"	25060
1"	26060
1-1/4"	27070
1-1/2"	28070

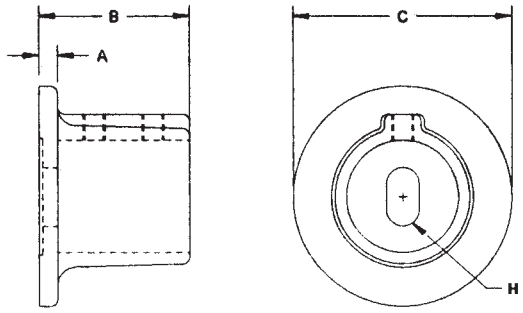
No. 42 Round Base Flange





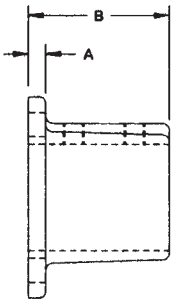
I.P.S. Size	Item Number	A	B	C	D	E	F	G	H	J
1-1/4"	27090	3/8"	2-1/8"	4-1/2"	2-1/2"	–	–	–	7/16" ∅	–
1-1/2"	28090	3/8"	2-5/16"	4-1/2"	2-1/2"	–	–	–	7/16" ∅	–
No. 42 Round Base Flange – 3 Mounting Holes										
3/4"	25080	1/4"	1-3/4"	2-1/2"	2"	1-1/2"	3/16"			
1"	26080	11/32"	1-5/32"	3"	2-11/32"	1-11/32"	1/4"			

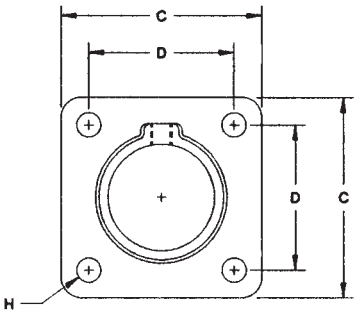
No. 43 Round Wall Flange



I.P.S. Size	Item Number	A	B	C	D	E	F	G	H	J
3/4"	25100	1/4"	1-3/4"	2-1/2"	–	–	–	–	7/16" ∅	–
1"	26100	5/16"	2-1/8"	3"	–	–	–	–	15/32" x 7/8"	–
1-1/4"	27100	5/16"	2-7/16"	3-1/2"	–	–	–	–	17/32" x 1"	–
1-1/2"	28100	5/16"	2-9/16"	3-3/4"	–	–	–	–	9/16" x 1"	–

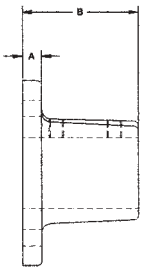
No. 45 Square Floor Flange

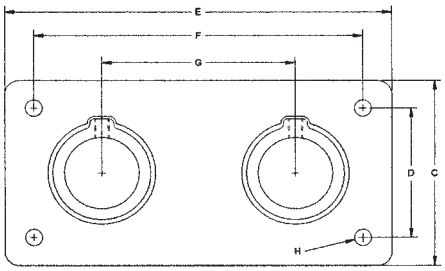




I.P.S. Size	Item Number	A	B	C	D	E	F	G	H	J
3/4"	25120	1/4"	1-1/2"	2-5/8"	1-3/4"	–	–	–	5/16" Ø	–
1"	26120	1/4"	1-13/16"	3"	2-1/16"	–	–	–	5/16" Ø	–
1-1/4"	27130	5/16"	2-3/16"	3-11/32"	2-3/8"	–	–	–	7/16" Ø	–
1-1/2"	28130	5/16"	2-17/32"	3-5/8"	2-5/8"	–	–	–	7/16" Ø	–

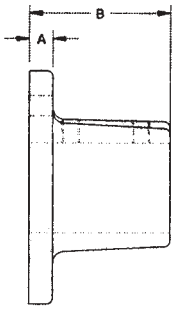
No. 45D Dual Barrel Flange

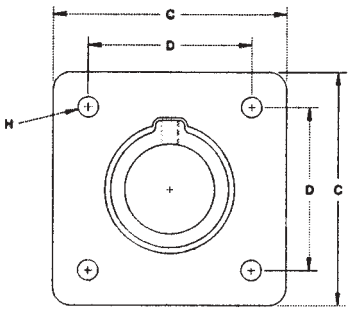




I.P.S. Size	Item Number	A	B	C	D	E	F	G	H	J
1-1/2"	28670	1/2"	3"	5"	3-1/2"	10"	8-1/2"	5"	7/16" Ø	-

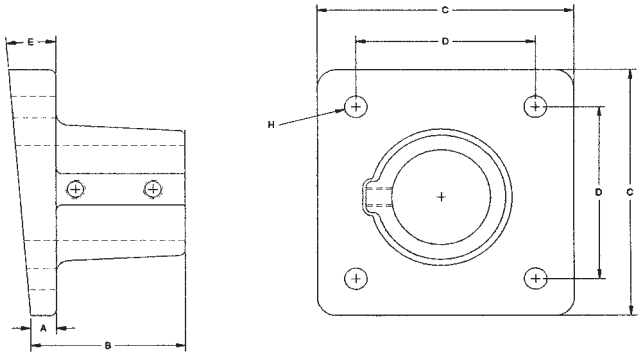
No. 45SBC Square Floor Flange





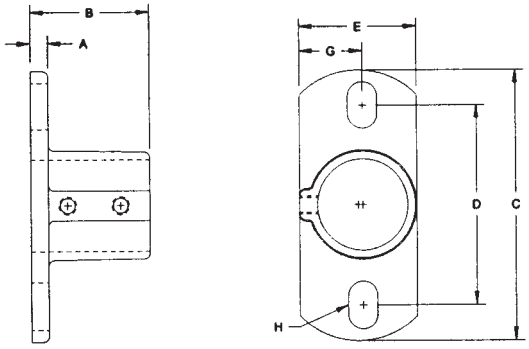
I.P.S. Size	Item Number	A	B	C	D	E	F	G	H	J
1-1/2"	28470	1/2"	3"	5"	3-1/2"	–	–	–	7/16" Ø	–

No. 45SBCS Sq. Floor Flange (1-12 Slope)



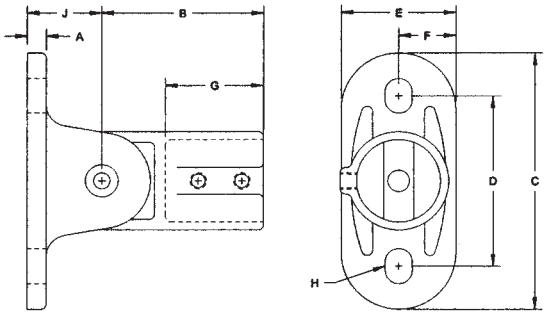
I.P.S. Size	Item Number	A	B	C	D	E	F	G	H	J
1-1/2"	28480	1/2"	3"	5"	3-1/2"	1:12	-	-	7/16" ∅	-

No. 46 Base Flange



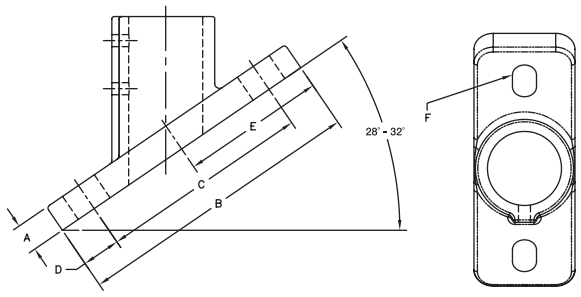
I.P.S. Size	Item Number	A	B	C	D	E	F	G	H	J
1-1/4"	27140	3/8"	2-3/16"	5-3/4"	4-1/4"	2-1/2"	–	1-11/32"	9/16" x 13/16"	–
1-1/2"	28140	9/16"	3"	6"	4-1/4"	2-3/4"	–	1-3/8"	9/16" x 13/16"	–

No. 46ADJ Adj. Flange



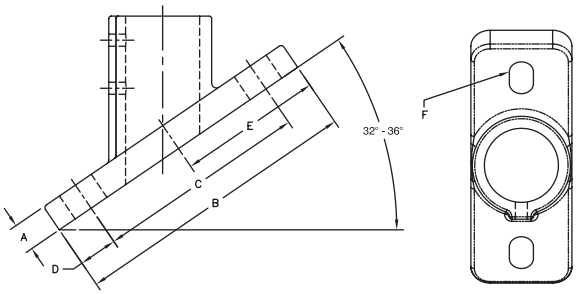
I.P.S. Size	Item Number	A	B	C	D	E	F	G	H	J
1-1/4"	27150	7/16"	3-11/16"	6"	4"	2-5/8"	1-5/16"	2-1/4"	9/16" x 13/16"	1-11/16"
1-1/2"	28150	7/16"	3-11/16"	6"	4"	2-5/8"	1-5/16"	2-1/4"	9/16" x 13/16"	1-11/16"

No. 46AF1 Angle Base Flange 28° – 32



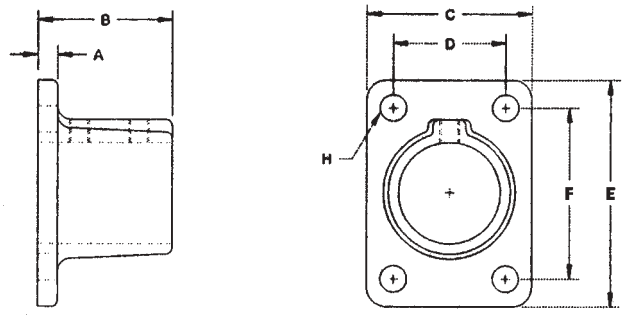
I.P.S. Size	Item Number	A	B	C	D	E	F	G	H	J
1-1/2"	28710	23/32"	7-1/2"	5-1/2"	1"	3-3/4"	5/8" x 1"	–	–	–

No. 46AF2 Angle Base Flange 32° – 36



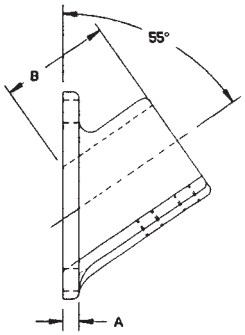
I.P.S. Size	Item Number	A	B	C	D	E	F	G	H	J
1-1/2"	28720	23/32"	7-1/2"	5-1/2"	1"	3-3/4"	5/8" x 1"	–	–	–

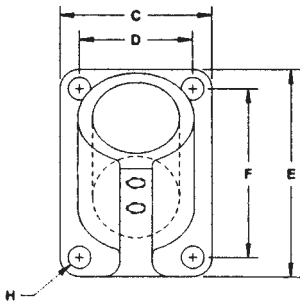
No. 47 Rectangular Base Flange



I.P.S. Size	Item Number	A	B	C	D	E	F	G	H	J
3/4"	25160	1/4"	1-3/4"	1-7/8"	(2) on CL	3-1/2"	2-5/8"	–	5/16" Ø	–
1"	26160	9/32"	1-13/16"	2-3/8"	1-7/16"	3-1/2"	2-5/8"	–	5/16" Ø	–
1-1/4"	27170	5/16"	2-1/8"	2-15/16"	1-7/8"	4-1/16"	3"	–	7/16" Ø	–
1-1/2"	28170	3/8"	2-17/32"	3-1/8"	2-1/8"	4-5/16"	3-1/4"	–	7/16" Ø	–
2"	29170	3/8"	2-7/8"	3-3/4"	2-5/8"	5"	3-3/4"	–	7/16" Ø	–

No. 47AF Angle Base Flange (55°)

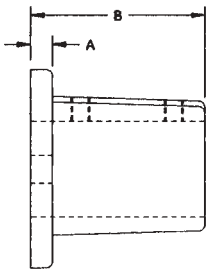


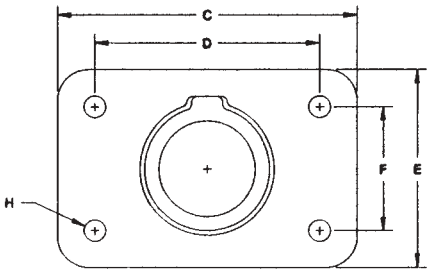


I.P.S. Size	Item Number	A	B	C	D	E	F	G	H	J
3/4"	25180	1/4"	1-1/2"	1-7/8"	1-3/16"	3-1/2"	2-13/16"	–	5/16" Ø	–
1"	26180	1/4"	1-13/16"	2-3/8"	1-5/8"	3-1/2"	2-3/4"	–	5/16" Ø	–
1-1/4"	27180	5/16"	2-1/8"	2-15/16"	2-1/8"	4-1/16"	3-5/16"	–	5/16" Ø	–

No. 48 Heavy-Duty Base Flange (4-Hole)

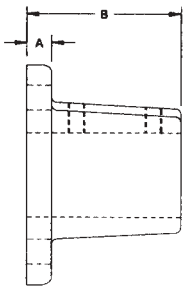
Also available with 2 mounting holes.

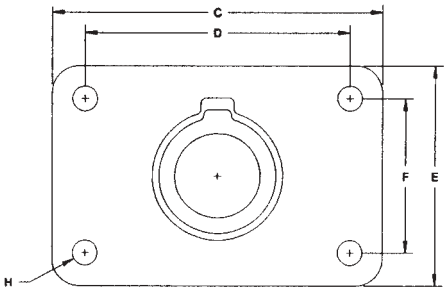




I.P.S. Size	Item Number	A	B	C	D	E	F	G	H	J
1-1/2"	28200	7/16"	3-1/2"	6"	4-1/2"	4"	2-1/2"	–	7/16" Ø	–
2"	29220	9/16"	3-1/2"	8"	6"	5"	3-1/2"	–	9/16" Ø	–

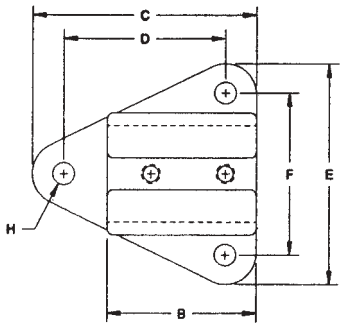
No. 48BC Heavy-Duty Rect. Base Flange

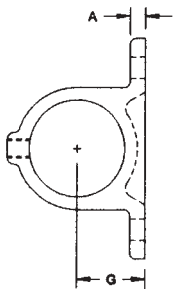




I.P.S. Size	Item Number	A	B	C	D	E	F	G	H	J
1-1/2"	28490	9/16"	3-1/2"	7-1/2"	6"	5"	3-1/2"	–	9/16" Ø	–

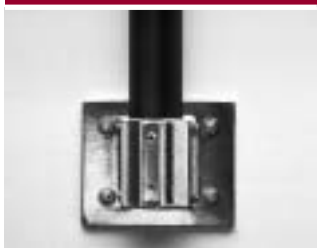
No. 50 Wall Mount Flange

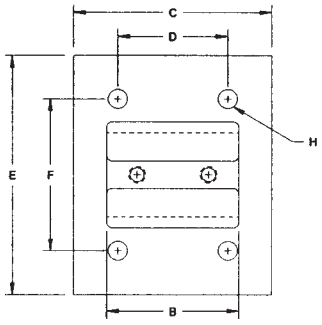


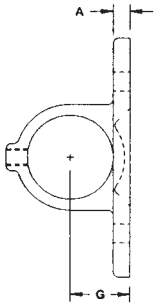


I.P.S. Size	Item Number	A	B	C	D	E	F	G	H	J
3/4"	25270	3/16"	2"	3-1/4"	2-1/4"	3-3/16"	2-1/4"	1"	5/16" Ø	–
1"	26270	1/4"	2-1/4"	3-7/8"	2-5/8"	3-3/4"	2-1/2"	1-1/16"	5/16" Ø	–
1-1/4"	27280	3/8"	2-1/2"	3-7/8"	2-5/8"	4-1/4"	3"	1-9/32"	7/16" Ø	–
1-1/2"	28280	5/16"	3"	4-1/2"	3-1/4"	4-7/16"	3-1/4"	1-3/8"	7/16" Ø	–

No. 52 Wall Flange





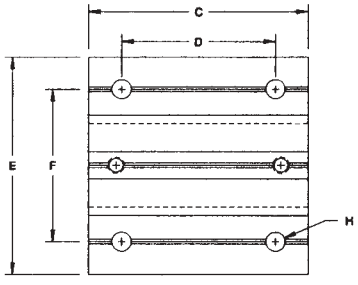


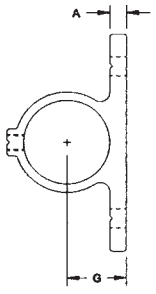
I.P.S. Size	Item Number	A	B	C	D	E	F	G	H	J
1-1/4"	27290	3/8"	3"	4"	2-1/2"	5-1/2"	4"	1-17/32"	7/16" Ø	–
1-1/2"	28290	3/8"	3"	4-1/2"	3"	5-1/2"	4"	1-11/32"	7/16" Ø	–

No. 52E Extruded Wall Flange (4-Hole)*

Also available with 2 mounting holes.

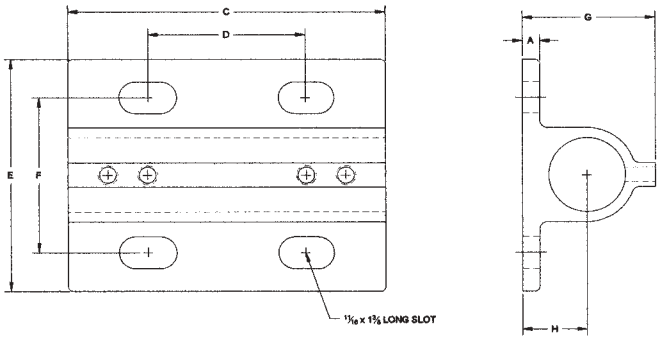
* Must be used with aluminum pipe.





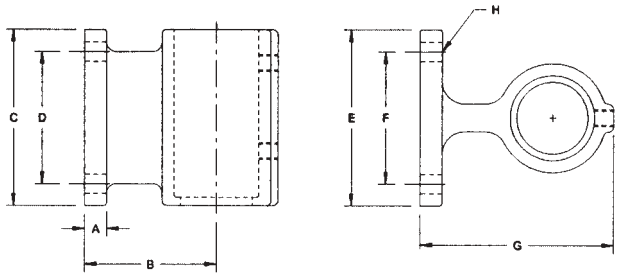
I.P.S. Size	Item Number	A	B	C	D	E	F	G	H	J
1-1/4"	27300	3/8"	–	5"	3-1/2"	5"	3-1/2"	1-11/32"	7/16" Ø	–
1-1/2"	28300	3/8"	–	5"	3-1/2"	5"	3-1/2"	1-11/32"	7/16" Ø	–
2"	29300	7/16"	–	5"	3-1/2"	6"	4-1/2"	1-5/8"	9/16" Ø	–

No. 52HD Extra Heavy-Duty Wall Flange



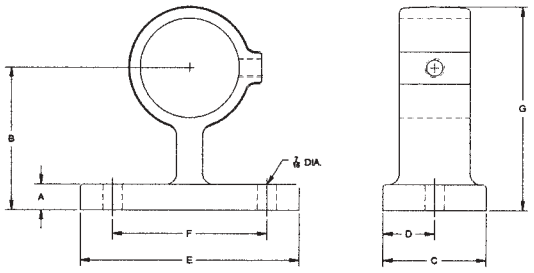
I.P.S. Size	Item Number	A	B	C	D	E	F	G	H	J
1-1/2"	28580	7/16"	-	8"	4"	6"	4-1/2"	3-5/16"	1-5/8"	-

No. 54-3/4/5 Offset Wall Flange



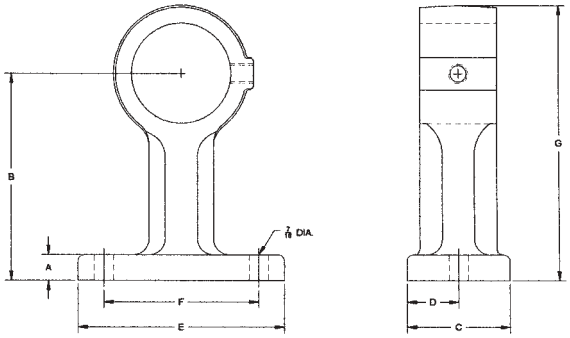
I.P.S. Size	Item Number	A	B	C	D	E	F	G	H	J
1-1/2"	28330 (3")	1/2"	3"	4"	3"	4"	3"	–	7/16" Ø	–
1-1/2"	28340 (4")	1/2"	4"	4"	3"	4"	3"	–	7/16" Ø	–
1-1/2"	28350 (5")	1/2"	5"	4"	3"	4"	3"	–	7/16" Ø	–

No. 55 Offset Support Bracket



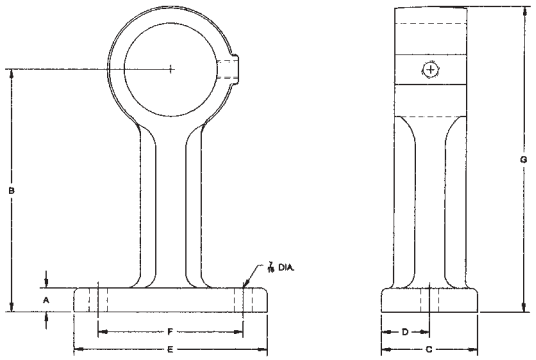
I.P.S. Size	Item Number	A	B	C	D	E	F	G	H	J
1-1/4"	27360	1/2"	2-3/4"	2"	1"	4"	3"	3-3/4"	-	-
1-1/2"	28360	1/2"	2-3/4"	2"	1"	4"	3"	3-15/16"	-	-

No. 55-4 Offset (4") Wall Bracket



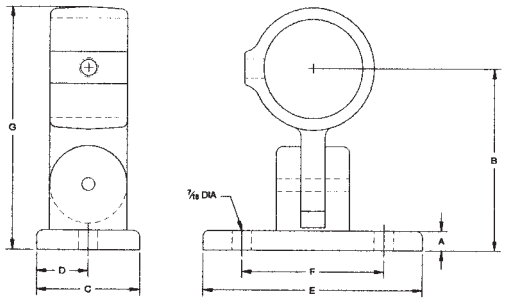
I.P.S. Size	Item Number	A	B	C	D	E	F	G	H	J
1-1/2"	28370	1/2"	4"	2"	1"	4"	3"	5-5/16"	-	-

No. 55-5 Offset (5") Wall Bracket



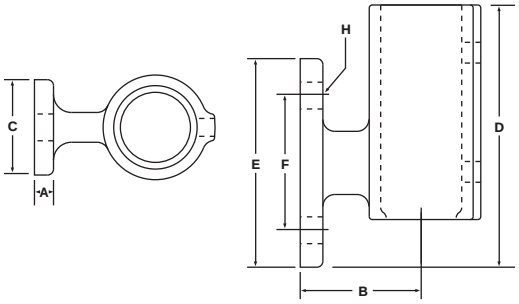
I.P.S. Size	Item Number	A	B	C	D	E	F	G	H	J
1-1/2"	28380	1/2"	5"	2"	1"	4"	3"	6-5/16"	-	-

No. 56 Adj. Offset Wall Bracket



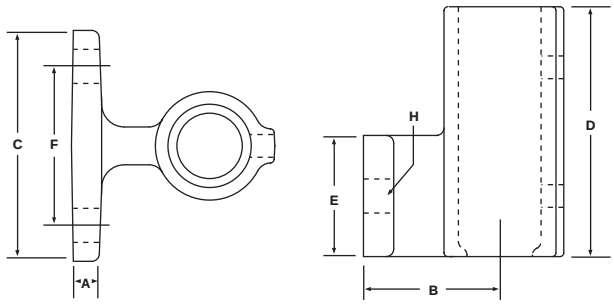
I.P.S. Size	Item Number	A	B	C	D	E	F	G	H	J
1-1/4"	27390	3/8"	3-1/4"	2"	1"	4-1/4"	2-11/16"	4-5/16"	-	-
1-1/2"	28390	3/8"	3-3/4"	2"	1"	4-1/4"	2-11/16"	4-15/16"	-	-

No. 57-7 Offset Flange



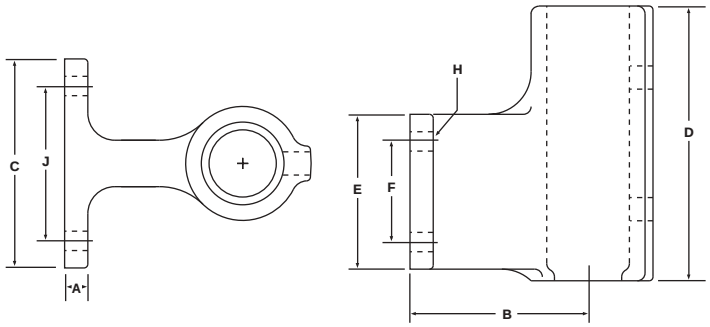
I.P.S. Size	Item Number	A	B	C	D	E	F	G	H	J
1-1/4"	27800	12/32"	2-17/32"	2"	5-1/2"	4-3/8"	2-13/16"	5-5/16"	9/16" Ø	-

No. 58-6 Offset Flange



I.P.S. Size	Item Number	A	B	C	D	E	F	G	H	J
1"	26810	7/16"	2-1/4"	3-13/16"	4-1/8"	2"	2-5/8"	-	9/16" Ø	-

No. 59-6 Offset Flange



I.P.S. Size	Item Number	A	B	C	D	E	F	G	H	J
1"	60121	7/16"	2-7/8"	3-3/8"	4-7/16"	2-1/2"	1-5/8"	5-5/16"	9/16" Ø	2-1/2"

Accessories

Hollaender® has a full line of accessories to complete any handrail or pipe structure project, including, but not limited to:

- **Gates – Self Closing Gates, Queue Gates, Swing Gates**
- **Gate Latches & Hinges**
- **Splices – Internal/External and Locking/Non-Locking**
- **Toeplate**
- **Toeplate Brackets, Splices, Clamps & Hardware**
- **Wall Brackets**
- **Wall Returns**
- **End Loops, Tangent Bends**
- **Finishes – Anodized, Powder Coated**
- **Shelf/Gridwall Support Options**

Hollaender®'s Unique Beveled Toeplate Design

Hollaender®'s unique beveled toeplate design allows for quick and easy installation. No drilling or welding; an extruded channel allows for secure attachment with no exposed fasteners. Uniform 1/8" wall thickness and beveled shape provides rigid non-buckling performance with the benefit of lightweight, easy handling.

4" Beveled Toeplate-Anodized Aluminum	Item Number
	94102
	Sold in 24' lengths.

No. 49A Toe-Board Bracket	I.P.S. Size	Item Number
	1-1/2"	28250

Hollaender

No. 49B Toe-Board Bracket	I.P.S. Size	Item Number
	1-1/2"	28260

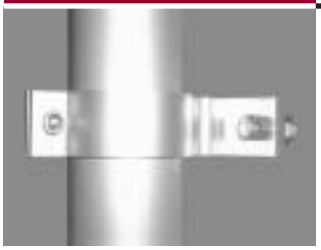
No. 52ES Extruded Offset Bracket (1" Cut)	I.P.S. Size	Item Number
	1-1/4"	27610
	1-1/2"	28610
	2"	29610

No. 49BTCS Bev. Toe-Board Corner Splice	I.P.S. Size	Item Number
	1-1/2"	28525

No. 70E Internal Coupling (Friction Fit)	I.P.S. Size	Item Number
	1-1/4"	07640 (4" length)
	1-1/2"	08640 (4" length)
	1-1/4"	93115 (12' length)
	1-1/2"	93125 (12' length)

No. 49BTS Bev. Toe-Board Straight Splice	I.P.S. Size	Item Number
	1-1/2"	28536

No. 70ES Internal Locking Splice	I.P.S. Size	Item Number
	1-1/2"	08655 (4" length)
	2"	09655 (4" length)
	2"	09665 (10" length)

No. 49C Toe-Board Clamp*	I.P.S. Size	Item Number
	1-1/2"	28546

* Must be used with aluminum pipe.

No. 76 Gate Hinge	I.P.S. Size	Item Number
	1-1/2"	08670
	2"	09670

No. 49F Toe-Board Bracket	I.P.S. Size	Item Number
	1-1/2"	28576

No. 78I Gate Hinge Female Extrusion	I.P.S. Size	Item Number
	1-1/4"	07690
	1-1/2"	08690

No. 82 Handrail Bracket

I.P.S. Size	Item Number
1-1/4" & 1-1/2"	07875

Centerline of rail 4-1/8" from wall.

Use with 84L/84R Wall Return.

No. 82A Handrail Bracket

I.P.S. Size	Item Number
1-1/4" & 1-1/2"	07885

Centerline of rail 3" from wall.

Use with 84AL/84AR Wall Return.

No. 82E Extruded Handrail Bracket*

I.P.S. Size	Item Number
1-1/4" & 1-1/2"	07895

* Must be used with aluminum pipe.

Centerline of rail 2-1/2" from wall.

No. 84L/84R Handrail Return

I.P.S. Size	Item Number
1-1/4"	07900 (84AL)
	07910 (84AR)
1-1/4"	07920 (84L)
	07930 (84R)

No. 145 Panel Clip

Size			Item Number
1-1/2"	145-8	15/32" Slot (round pipe)	58206
1-1/2"	145J-8	25/32" Slot (round pipe)	58286
1-1/2"	145S-8	1/4" Slot (round pipe)	58287
	145F	15/32" Slot (flat pipe)	58207

Heavy Duty Pin Latch & Hinge Assembly

I.P.S. Size	Item Number
2"	52095

LATCH GATE Gate Hinge & Latch Assem.

I.P.S. Size	Item Number
1-1/4"	51023
1-1/2"	51042

No. 8GQE Queue Gate

I.P.S. Size	Item Number
1-1/2"	51706

Interna-Rail Gate*

I.P.S. Size	Item Number
1-1/2"	51216

Speed Rail Gate*

I.P.S. Size	Item Number
1-1/4"	51005
1-1/2"	51105
2"	52105

Hollaender

Wall Return Bend

I.P.S. Size	Item Number
1-1/2"	49301

(1) #70ES Included.

2-Rail Offset Sloping Post

I.P.S. Size	Item Number
1-1/2"	42195

Fasteners to attach rails included.

End Loop

I.P.S. Size	Item Number
1-1/2"	49101

(2) #70ES Included.

Tangent Bend

I.P.S. Size	Item Number
1-1/2"	49201

(2) #70ES Included.

Rivet Nuts

I.P.S. Size	Item Number
1/4-20 x .75"	79123
5/16-18 x .94"	79233

Rivet Nut Setting Tools

Model No.	Item Number
RST3	71012
RST4	71013

RST3 - Heavy-Duty Lever Tool

RST4 - Pneumatic-Hydraulic Power

Tamper Resistant Set Screw & Tool

Size	Item Number
3/8-16 x 7/16"	80532

JS-600 Set Screws

Size	Item Number
3/8-16 x 7/16"	80612
5/16-18 x 5/16"	80312

304 Stainless Steel Set Screws

Size	Item Number
3/8-16 x 7/16"	81612
5/16-18 x 5/16"	81312
3/8-16 x 1-7/16"	81913

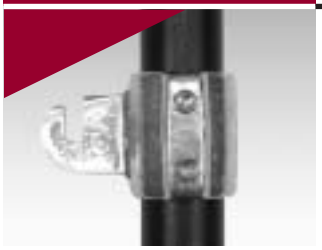
*Gates are not designed to be used as a ladder rung or an aid for climbing. Welded assembly gates also available.

Shelf/Gridwall Support Options

Tubular Dowel	I.P.S. Size	Item Number
	1-1/2" Sched. 40	93201

Solid Dowel	I.P.S. Size	Item Number
	1-1/2" Sched. 40	93200

No. 17HM Hook	Size	Number
	1-1/4"	07490
	1-1/2"	08490

No. 17MG Gridwall Fitting Single Tab	Size	Number
	3/4"	05288
	1"	06288

No. 19MG Gridwall Fitting Double Tab	Size	Number
	3/4"	05348
	1"	06348

No. 27MG Gridwall Fitting Double Tab	Size	Number
	3/4"	05458
	1"	06458

No. 50T Pipe/Tube Support 5/16" Holes	Size	Number
	1"	26850

Hollaender

Shelf/Gridwall Support Options

No. 50TG Gridwall Fitting with 2 Tabs	Size	Number
	1"	26853

No. 75 Signage Clamp	Size	Number
	1"	06710

No. 94 Double Tab Bracket – Oval Slot	Size	Number
	1-1/2"	08780

No. 95 Single Tab Bracket – Oval Slot	Size	Number
	1-1/2"	08790

Accessories

Speed-Rail®

Hollaender®

Constructed of aluminum/magnesium alloy, Speed-Rail® Systems are manufactured with maximum flexibility and strength in mind to provide you with years of structural integrity for a wide variety of demanding applications.

- Fittings and pipes are shipped to site, assembled at project location.
- Rapid installation, ease of repair and reconfiguration.

- Set screws have a proprietary internal-external knurl cup design that prevents screws from backing out in the heaviest vibration conditions.
- Available in 3/4", 1", 1 1/4", 1 1/2", 2" IPS systems.

- Fittings are cast from ALMAG 535, aluminum - magnesium alloy - the most corrosion resistant casting alloy available today.
- Will work with any other metal, including steel, and will not suffer from “galvanic reaction corrosion”.

Speed-Rail® queue line systems are used throughout the amusement industry in small to large parks.

Speed-Rail® with infill panel systems that meet IBC or other codes provide an "industrial chic" look.

For OHSA regulated areas, Speed-Rail® is the most frequently used product, often in conjunction with galvanized steel pipe.

Interna-Rail® with 2" Wire Mesh Infill Panels

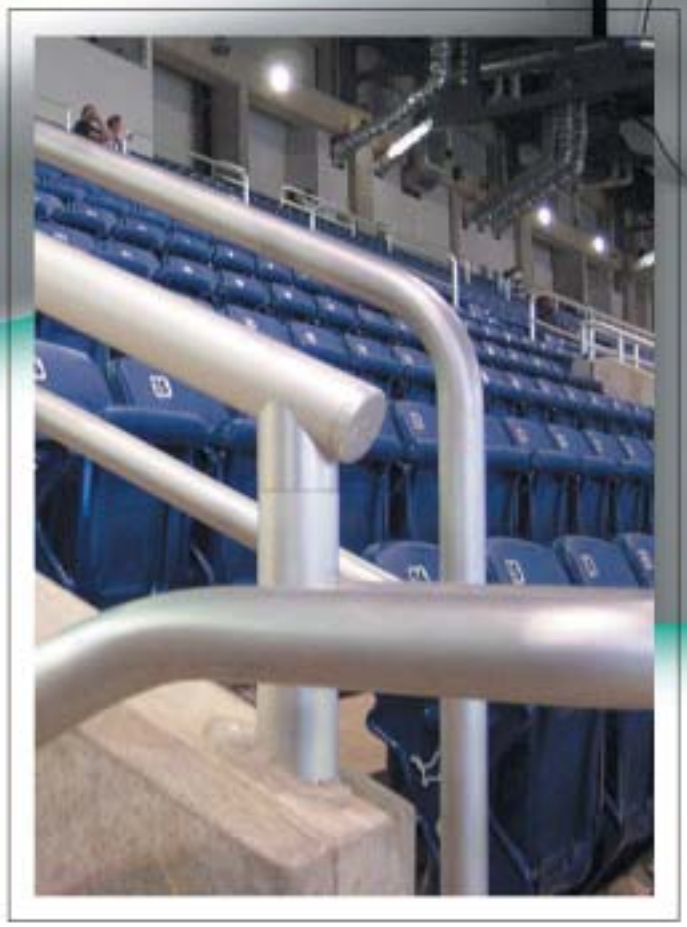
For applications which require a sleek architectural design and finish.

- **Appearance** – Design of Interna-Rail® combines the clean look of welded rail with all the benefits of a mechanical system.
- **Strength** – Interna-Rail® systems can be designed to meet any building code. Please refer to Technical Section of Catalog, www.hollaender.com or call our engineers.

- **Corrosion Resistance** – All Interna-Rail® aluminum fittings are supplied with a 215-R1 (M10C22A41) Anodized finish which provides an additional resistance to corrosion and staining. The hardware supplied with the product is stainless steel and anodized aluminum (mill finish fittings also available).

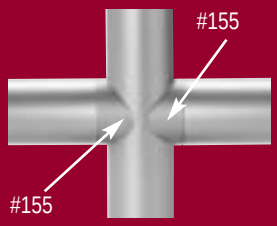
- **Durability** – The double tang set screw activated design provides a virtually maintenance free system which is inherently longer lasting than those which utilize adhesives and pop rivets.

Powder coated Interna-Rail® with infill panels, meeting all IBC codes.



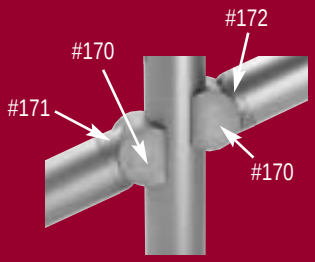
Mid-rails and aisle rails using Interna-Rail® are being used in bleachers and stadiums throughout the U.S.

Typical Interna-Rail® System Assemblies and Fittings



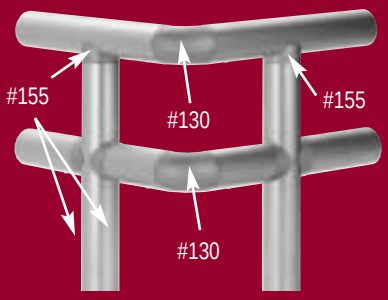
Typical Assembled Cross

Typical Corner Post Assembly

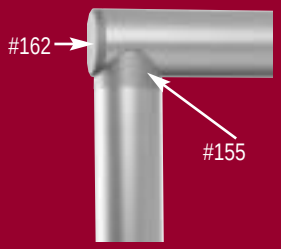


Typical Adjustable Angle Cross

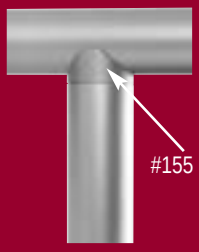
Angle Tee



Corner Elbow Assembly



End Post with Cap



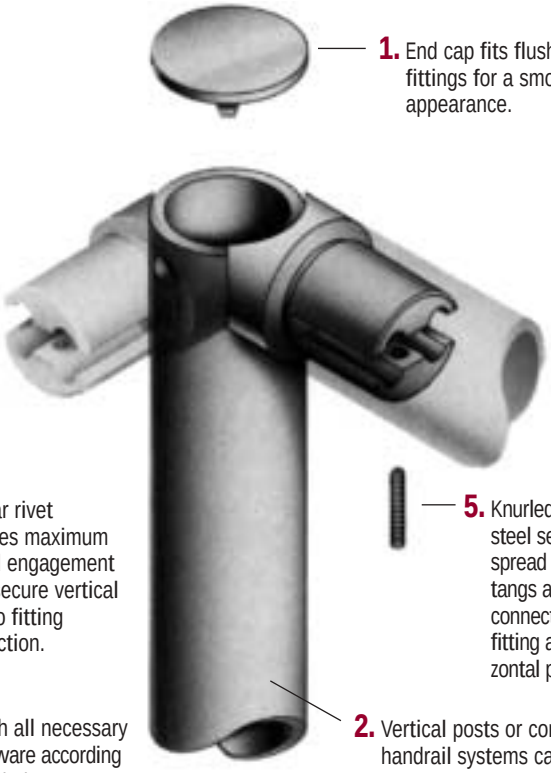
Typical Straight Tee

How the Tubular Rivet works.

After drilling hole, tubular rivet is inserted.

A header tool is then used to crimp the rivet inside the pipe wall.

Once in position, the fitting is connected to the vertical pipe with the use of a socket head cap screw.



1. End cap fits flush with fittings for a smooth appearance.

2. Vertical posts or complete handrail systems can be specified.

3. Fittings are supplied with all necessary modifications and hardware according to the configuration needed.

4. Socket head cap screw connects fitting to the installed tubular rivet with a hex wrench.

5. Knurled stainless steel set screws spread the fitting tangs apart while connecting the fitting and horizontal pipe.

6. Tubular rivet provides maximum thread engagement for a secure vertical post to fitting connection.

No. 62P Plastic Plug Sch. 40

I.P.S. Size	Item Number
3/4"	71501
1"	71502
1-1/4"	71500
1-1/2"	71503
2"	71504

No. 130 Elbow

I.P.S. Size	Item Number
1-1/2"	58016

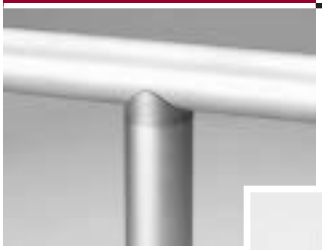
No. 140 Grout Cover Ring

I.P.S. Size	Item Number
1-1/2"	58026

No. 145 Panel Clip

Size			Item Number
1-1/2"	145-8	15/32" Slot (round pipe)	58206
1-1/2"	145J-8	25/32" Slot (round pipe)	58286
1-1/2"	145S-8	1/4" Slot (round pipe)	58287
	145F	15/32" Slot (flat pipe)	58207

No. 155 Tee



I.P.S. Size	Item Number
1-1/2"	58036
2"	59036

No. 159L Left Corner

I.P.S. Size	Item Number
1-1/2"	58066

No. 159R Right Corner

I.P.S. Size	Item Number
1-1/2"	58076

No. 162 Plug

I.P.S. Size	Item Number
1-1/2"	58086

No. 170 Trunion	I.P.S. Size	Item Number
	1-1/2"	58096

No. 171 Sch. 40 Acute Angle Tee*	I.P.S. Size	Item Number
	1-1/2"	58106

* #170 Trunion Required

No. 172 Sch. 40 Obtuse Angle Tee*	I.P.S. Size	Item Number
	1-1/2"	58116

* #170 Trunion Required

No. 173 Sch. 40 Acute Tee	I.P.S. Size	Item Number
	1-1/2"	58126

No. 174 Sch. 40 Obtuse Tee	I.P.S. Size	Item Number
	1-1/2"	58226

No.175F Sch. 80 Acute Tee Adjust. Angle*	I.P.S. Size	Item Number
	1-1/2"	58786

* #170 Trunion Required

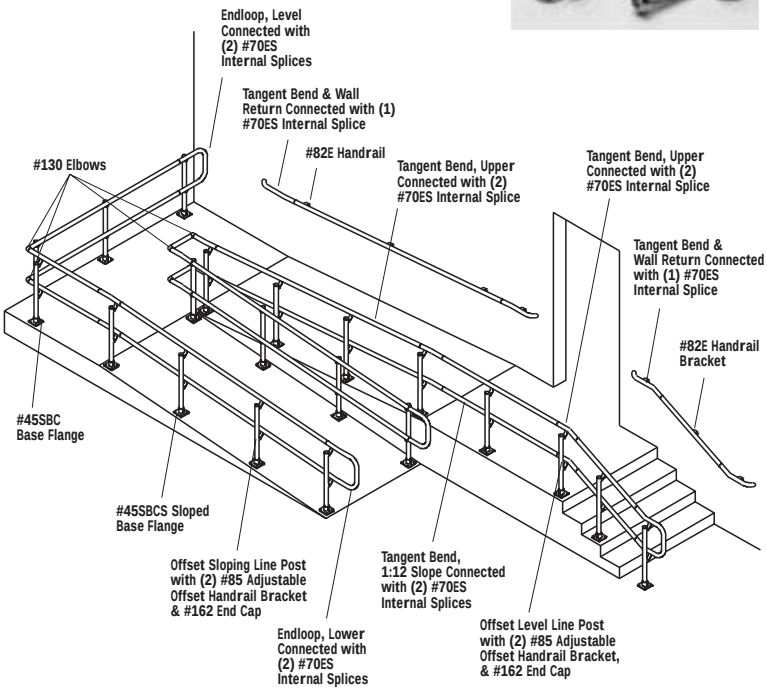
No. 185 Post Return Swivel	I.P.S. Size	Item Number
	1-1/2"	58166 (right)
	1-1/2"	58176 (left)

ADA Handrail

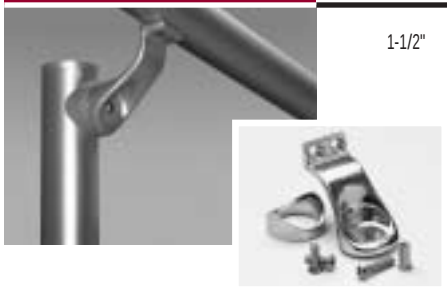
Handrail system is designed to meet the requirements of the Americans with Disabilities Act.

- ADA handrail can be purchased as individual fittings and pipe or assembled components.
- Designed to allow for easy site assembly and installation of handrail on both new constructions or alterations.
- All hardware is stainless steel and anodized aluminum.
- Handrail bracket (#85) can be rotated to any angle (within the #85A splice) for ramps or stairs.

- Provides for 1-1/2" clearance between handrail and post or wall.
- The underslung, rounded design creates a continuous gripping surface with no sharp edges.
- System can be supplied mill, anodized or powder coated.
- End Loops, Wall Returns, Flanges, Elbows, Splices and Tangent Bends available.
- Grabrail meets both ADAAG and UFAS codes.



Typical ADA Railing Installation

No. 85 Adj. Handrail Bracket Kit	I.P.S. Size	Item Number
	1-1/2"	08945

2-Rail Offset Sloping Post	I.P.S. Size	Item Number
	1-1/2"	42195

Fasteners to attach rails included.

End Loop	I.P.S. Size	Item Number
	1-1/2"	49101

(2) #70ES Included.

Tangent Bend	I.P.S. Size	Item Number
	1-1/2"	49201

(2) #70ES Included.

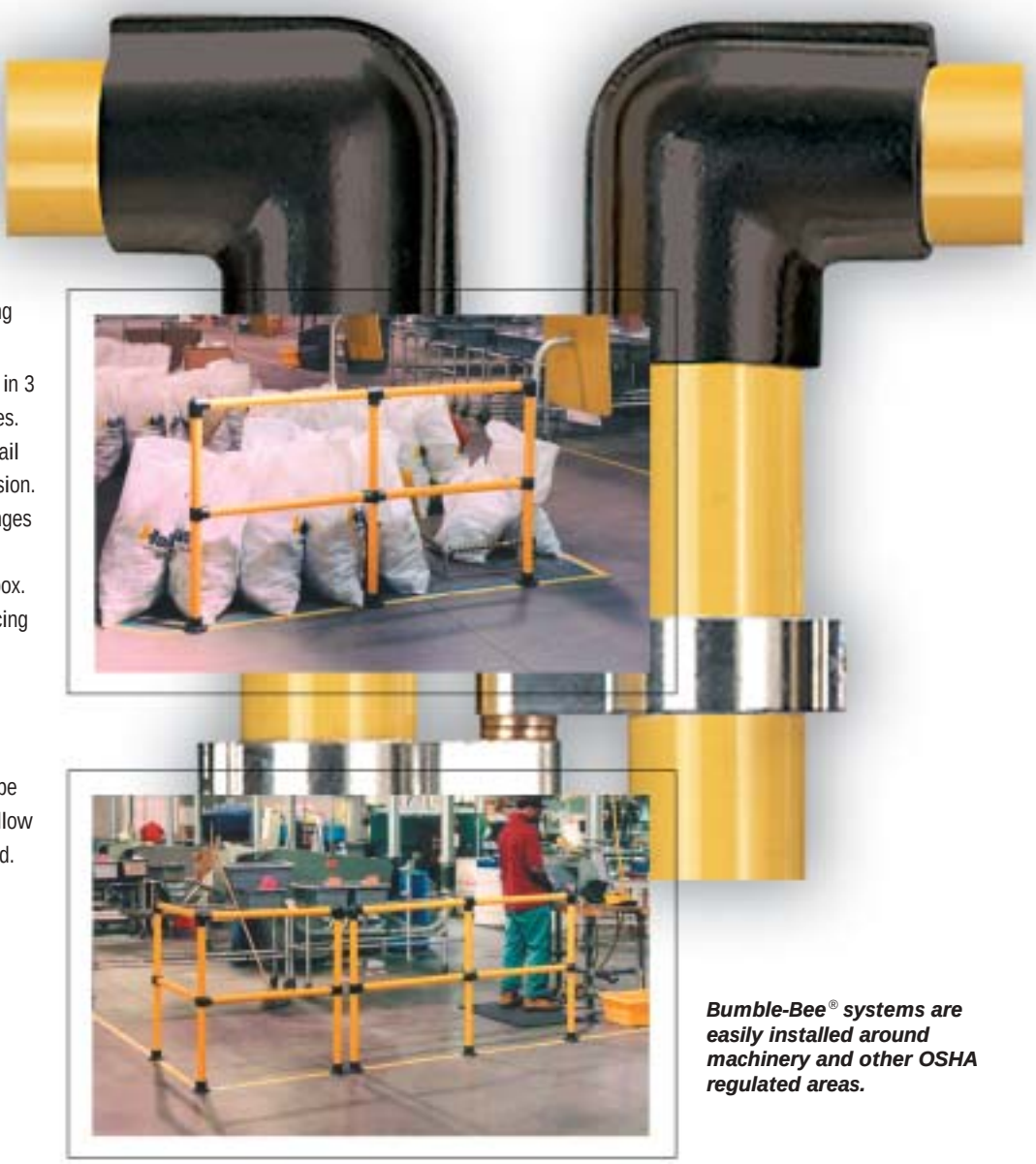
Wall Return Bend	I.P.S. Size	Item Number
	1-1/2"	49301

(1) #70ES Included.

Bumble-Bee® Safety Rail

The solution for all your demanding safety rail requirements.

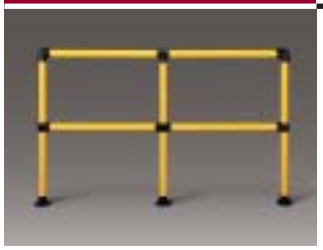
- Pre-Assembled Kits - Assemble in 3 minutes and install in 15 minutes.
- Choose from 3 standard safety rail kits - Corner, Straight and Extension.
- Instructions, Hex Key, Base Flanges & Test Results showing OSHA compliance all included in the box.
- Saves time and labor by enhancing assembly in initial installations, disassembly when installation changes and retrofitting of old installations.
- Supplied standard with steel pipe powder coated OSHA safety yellow and fittings black powder coated.

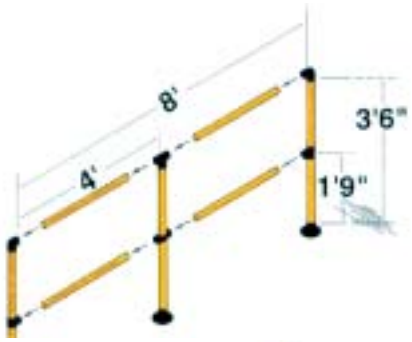


Bumble-Bee® systems are easily installed around machinery and other OSHA regulated areas.

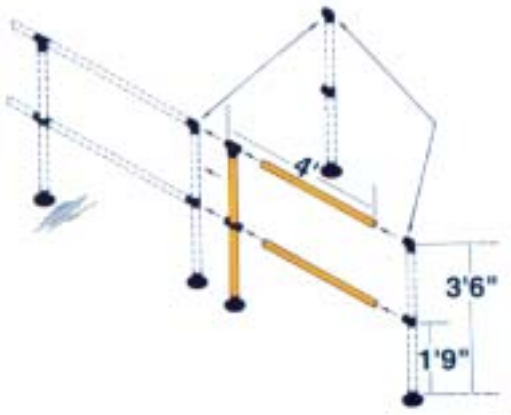
- Rugged
- Dependable
- Flexible
- Virtually Maintenance Free
- Quick & Easy
- Rail sections can be installed without the need of skilled labor and expensive equipment

No. 50111 Corner Section Kit, Steel	I.P.S. Size	Item Number
	1-1/2"	50111

No. 50211 Straight Section Kit, Steel	I.P.S. Size	Item Number
	1-1/2"	50211



No. 50311 Extension Kit, Steel	I.P.S. Size	Item Number
	1-1/2"	50311



No. 50950 Safety Rail Gate, Steel	I.P.S. Size	Item Number
	1-1/2"	50950

Posts sold separately.

No. 50411 Yellow Steel Mid Rail 46"	I.P.S. Size	Item Number
	1-1/2"	50411

No. 50511 Yellow Steel Top Rail 47"	I.P.S. Size	Item Number
	1-1/2"	50511

No. 50911 Yellow Steel Post 40"	I.P.S. Size	Item Number
	1-1/2"	50911

Hollaender

No. 50700 #9 Flat Black Side Outlet Ell.	I.P.S. Size	Item Number
	1-1/2"	50700

No. 50710 #11E Flat Blk. Side Outlet Tee-E	I.P.S. Size	Item Number
	1-1/2"	50710

No. 50720 #5 Flat Black Tee	I.P.S. Size	Item Number
	1-1/2"	50720

No. 50730 #5E Flat Black Tee-E	I.P.S. Size	Item Number
	1-1/2"	50730

No. 50740 #7E Flat Black Cross-E	I.P.S. Size	Item Number
	1-1/2"	50740

No. 50750 #3 Flat Black Elbow	I.P.S. Size	Item Number
	1-1/2"	50750

No. 50760 #42 Flt. Blk. Rnd. Base Flange	I.P.S. Size	Item Number
	1-1/2"	50760

Structural Applications

Speed-Rail® and Interna-Rail® with infill panel systems that meet IBC or other codes provide an "industrial chic" look. In addition, Hollaender®'s panel retention system, using panel retainers attached to the rail system with self-tapping screws, can accept any thickness of material infill panel and still meet structural codes. The great variety of pipe finishes (mill or anodized, powder coat in several colors) and infill panels (picket, perforated metal, wire mesh, horizontal rails) make these systems "designer friendly".

Structural Applications

- **Pipe Sizes for Hollaender® Fittings**
- **Ask the Hollaender® Engineers**
- **How to Specify:**
  1. Hollaender® Slip-On Structural Pipe Fittings
  2. Hollaender® Interna-Rail® Mechanical Handrail Systems
  3. Hollaender® A.D.A. Railing Systems

- **Aluminum-Magnesium Alloy 535.0 Data**
- **Building Codes**
- **Guardrail and Handrail Structural Design**
- **Safety Analysis Sheet**

Hollaender®

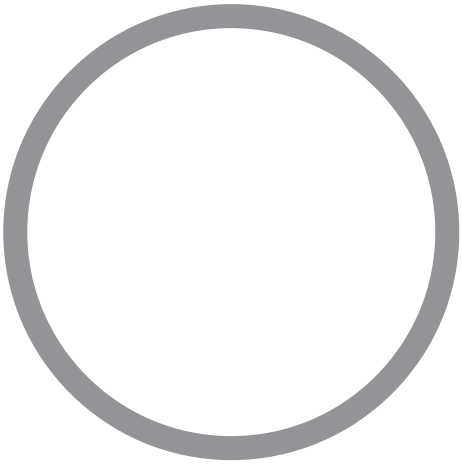
Pipe Sizes for Hollaender® Fittings

Hollaender® structural fittings are designed to be used with IPS pipe sizes. The correct pipe sizes are shown in the chart to the right.

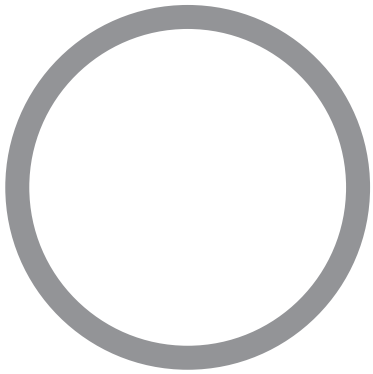
Pipe Size Chart

This chart is designed to print at the proper scale so that you can check your pipe against the chart and make sure it's the right size.

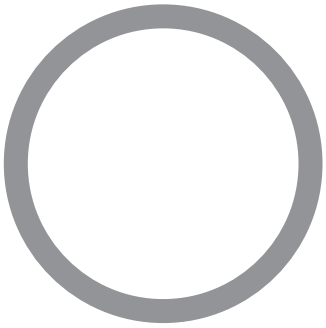
Fitting	Inside Diameter
Fitting Size	I.D. (in.)
3/4”	1.070
1”	1.335
1 1/4”	1.680
1 1/2”	1.925
2”	2.40



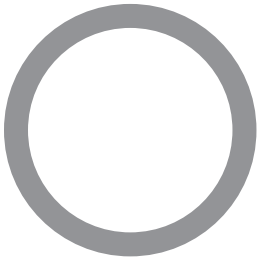
2" IPS
(2.375", 60mm O.D.)



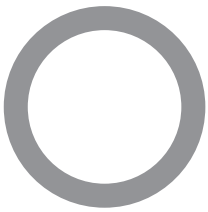
1-1/2" IPS
(1.900", 48mm O.D.)



1-1/4" IPS
(1.660", 42mm O.D.)



1" IPS
(1.315", 33mm O.D.)



3/4" IPS
(1.05", 26mm O.D.)

Q&A

ask the Hollaender® Engineers...

Q: Can the Hollaender® aluminum fittings be used with steel and stainless steel pipe?

A: Although most aluminum alloys will corrode when combined with a dissimilar metal (i.e. steel, black iron, stainless steel), the aluminum/magnesium alloy 535 which Hollaender® uses to manufacture all cast fittings is the most corrosive resistant casting alloy available and can be used with any type of metal.

Q: Have Hollaender® Fittings been tested in corrosive environments?

A: Yes, Hollaender® standard fittings have been tested for 1000 hrs. of salt spray (per ASTM B117 specifications) after which the set screws could still be removed and retightened. In addition, Hollaender® fittings' corrosion resistance to Hydrazine Fuel has also been tested by the United States Air Force prior to the products' use at Cape Canaveral Air Force Station and the Kennedy Space Center. Not only have our products been tested in the laboratory, but they have also stood the test of time for over forty years in some of the most corrosive environments including: chemical plants, offshore oil rigs, waste water treatment plants, pulp & paper mills, etc.

Q: If I have an extremely corrosive environment, are there any additional coatings or features that are available for the fittings to insure that the installation performs and continues to look good for a long time?

A: The standard material is highly corrosive resistant, however, for the most extreme environments, we recommend that the fittings be anodized and that stainless steel set screws be used. The anodizing process creates a coating, which is not only harder and more corrosive resistant than the base metal, but also provides significant resistance to staining.

Q: Should the fittings be used in a chlorine rich environment?

A: No. The chlorine aggressively attacks the aluminum, which can result in significant deterioration of our product. Our recommendation would be to use reinforced fiberglass railing in this environment.

Q: If Superman and a Speed-Rail® fitting were both placed in a vat of Hydrazine Fuel, which one would last longer?

A: According to the test reports, the fitting of aluminum would outlast the man of steel.

Q: What does IPS mean?

A: IPS stands for "Iron Pipe Size" – A standard which was originally developed for fluid transfer has also become the standard for handrail systems, both steel and aluminum.

Q: What determines the wall thickness of my pipe?

A: One of two terms will tell you the wall thickness of your pipe, either the "Schedule" or "Gauge." If you are using true IPS sizes, the wall thickness is determined by the schedule – the higher the schedule, the thicker the wall, i.e. 1-1/2" schedule 80 has a thicker wall than 1-1/2" schedule 40. For gauge sizes, the lower the number, the thicker the wall, i.e. 1.90" diameter 11 gauge is thicker than 1.90" diameter 12 gauge.

Q: What wall thickness should be used with Hollaender® fittings?

A: The actual wall thickness you select will depend upon the type of system you are assembling, however, the wall thickness should never be less than the minimums listed below.

Steel Pipe – Schedule 10 or 14 Gauge

Aluminum – Schedule 40 or 10 Gauge

Q: What pipe materials can I use with Hollaender® fittings?

A: Any metal pipe (including galvanized steel, stainless, black iron, aluminum, etc.) can be used with our slip-on fittings as long as it is sized properly (see above). Plastic, FRP and thin wall sleaving should never be used unless a reinforcing dowel is also used inside the pipe.

Hollaender®

How to Specify

How to Specify Hollaender®
Slip-On Structural Pipe Fittings:

The (handrail/guardrail, rack, or pipe structure) shall be constructed with (Speed-Rail®, Speed-Rail® II, Nu-Rail®, Rackmaster®, or Mend-A-Rail®) slip-on/bolt-on structural pipe fittings, as regularly manufactured by The Hollaender® Manufacturing Company, 10285 Wayne Avenue, Box 156399, Cincinnati, Ohio 45215-6399, of high-tensile aluminum-magnesium alloy 535.0 manufactured in compliance with ASTM B26, cast from high-purity ingot 535.2 that conforms to ASTM B179. All fittings shall be securely fastened to the pipe with internal/external, reverse knurl, cup point, hexagon socket set screws that conform to FF-S-200, and ANSI/ASME B18.3-1986 Type C/G. Set screws made of alloy steel shall conform to ASTM F912, and zinc plating shall be JS-600. Austenitic grade stainless steel set screws shall be 302 alloy. (The following federal specifications were re-written to incorporate high-tensile aluminum-magnesium slip-on structural fittings: Corps of Engineers Guide Specification, Military Construction, CEGS-05500; Corps of Engineers, Civil Works Construction Guide Specification, CW-05502; and Navy Facilities Guide Specification, NFGS-05500.)

How to Specify Hollaender®
Interna-Rail® Mechanical Handrail Systems:

The pipe handrail/guardrail shall be constructed with mechanically fastened, flush-fit Interna-Rail® aluminum or stainless steel fitting system as regularly manufactured by The Hollaender® Manufacturing Company, 10285 Wayne Avenue, Box 156399, Cincinnati, Ohio 45215-6399. The fitting shall be externally connected to the pipe by means of an anodized aluminum, tubular rivet nut, and an austenitic 302 alloy stainless steel, socket head cap screw with a stainless steel lock washer. The fitting shall be internally connected to the pipe by means of an internal double tang, expanded by an austenitic 302 alloy stainless steel, internal/external, reverse knurl, cup point, hexagon socket set screw. Pop rivets, sheet metal screws, and adhesives shall not be an acceptable fastening method. The fittings shall be machined of solid aluminum bar stock of alloy 6063-T6 conforming to ASTM B221, or austenitic stainless steel bar stock of 303 alloy conforming to ASTM A582, or machined castings of high-tensile aluminum-magnesium alloy 535.0 manufactured in compliance with ASTM B26, cast from high-purity ingot 535.2 conforming to ASTM B179. Flanges (if required) shall be sand cast from high-tensile aluminum- magnesium alloy 535.0, and fastened directly to the pipe by means of an internal/external, reverse knurl, cup point, hexagon socket set screw (flanges which include a bearing plate will not be accepted). Aluminum fittings with an anodized finish shall be clear satin anodized with a 0.7 mil thickness that meets the Aluminum Association specification of AAM10C22A41.

How to Specify Hollaender®
A.D.A. Railing System:

The pipe handrail/guardrail shall be constructed with mechanically fastened, smooth and continuous A.D.A. Railing System of aluminum fittings as regularly manufactured by The Hollaender® Manufacturing Company, 10285 Wayne Avenue, Box 156399, Cincinnati, Ohio 45215-6399. The design of the handrail bracket shall provide a 1-1/2" clearance between the post and the rail, and allow for adjustment of the rail to match the angle of the ramp or stairs. Handrail brackets and pipe fittings shall provide a continuous, uninterrupted gripping surface with no sharp edges or projections. The bracket shall be externally connected to the post by means of an anodized aluminum, tubular rivet nut, and an austenitic 302 alloy stainless steel, hexagon socket, button head, cap screw. The bracket shall be connected to the underside of the rail by means of two stainless steel, flat countersunk head, Type F self-tapping screws that conform to ANSI/ASME- B18.6.4. Pipe fittings shall be internally connected to the pipe by means of an internal double tang, expanded by an austenitic 302 alloy stainless steel, internal/external, reverse knurl, cup point, hexagon socket set screw. Pop rivets, sheet metal screws, and adhesives shall not be an acceptable fastening method. The brackets and fittings shall be of high-tensile aluminum-magnesium alloy 535.0 manufactured in compliance with ASTM B26, cast from high-purity ingot 535.2 conforming to ASTM B179.

Aluminum-Magnesium Alloy 535.0 Sand Castings
Chemical Composition and Physical Properties

Chemical Composition Limits per ASTM B 26-98

Si	Fe	Cu	Mn	Mg	Ti	Other	Al
0.15	0.15	0.05	0.10-0.25	6.2-7.5	0.01-0.25	0.15	Remainder

Typical Mechanical Properties

Temper	Ultimate Strength (ksi)	Yield Strength (ksi)	Elongation (% in 2 in.)	Shear Strength (ksi)	Compressive Yield Strength (ksi)	Brinell Hardness	Endurance Limit (ksi)
F	40	20	13	27.45	23.5	70	10
	(35 min.)	(18 min.)	(9 min.)			(70 min.)	ASTM B26-98

- Thermal Conductivity (@ 77F, SI units): 0.24 cal/cm*s*K
- Heat Treatment – Achieves its physical and mechanical properties as-cast (F). This eliminates the time and cost of heat treating.
- Machinability – Excellent machinability as-cast, excellent surface finish, and high dimensional stability.
- Corrosion Resistance – Highest of any cast alloy. It can be anodized for additional corrosion protection to a 0.7 mil thickness (215R1).
- Finishing – Produces an excellent surface finish by burnishing or polishing. Anodizes well to a clear-satin finish due to the minimal amount of silicon in the alloy.
- Weldability – It can be welded by any of the inert gas processes, T.I.G. or M.I.G., using filler rod of 5356 or 5183.

Load Capacity of Fitting Set Screws When Properly Torqued

Std. IPS Size Steel Pipe Schedule 40

Fitting Size	Torque Ft. Lbs.	No. Screws	Push Out
3/4"	13	1	1000 lbs.
	13	2	1900 lbs.
1"	14	1	1200 lbs.
	14	2	1800 lbs.
1-1/4"	14	1	1800 lbs.
	14	2	2000 lbs.
1-1/2"	17	1	1850 lbs.
	17	2	2350 lbs.
2"	17	1	1925 lbs.
	17	2	3200 lbs.

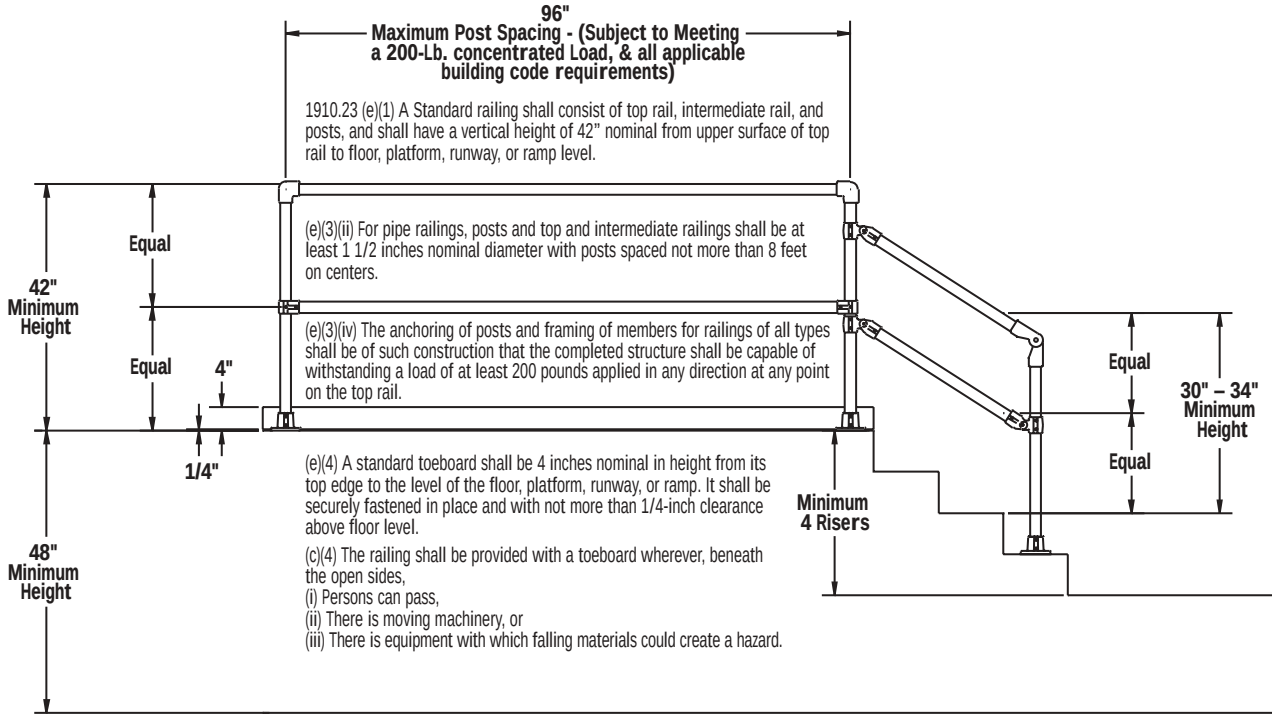
Above data compiled by an independent laboratory using the following test procedures: Standard I.P.S.-sized pipe within the vertical barrel of the test fittings, to the torque shown above. A 30,000 lb. Universal Testing Machine applied vertical load to the pipe member in an attempt to produce pipe slippage. Load capacities listed above are based on a safety factor of 2:1.

Aluminum IPS Size Pipe Schedule 40

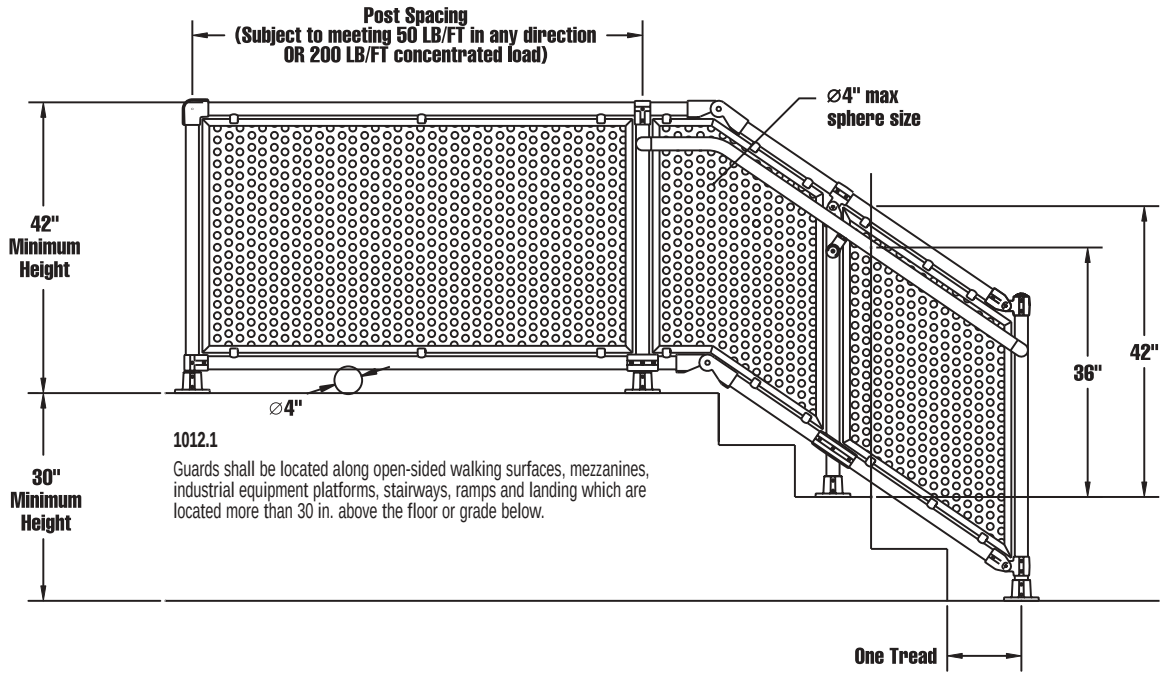
Fitting Size	Torque Ft. Lbs.	No. Screws	Push Out
1-1/4"	10	1	937 lbs.
	10	2	1006 lbs.
1-1/2"	12	1	950 lbs.
	12	2	1020 lbs.

Above data compiled by an independent laboratory using the following procedures: A 30,000 lb. Universal Testing Machine applied vertical load to the pipe member in an attempt to produce pipe slippage through the vertical barrel of the fitting. Load capacities listed above are based on a safety factor of 100%.

O.S.H.A. Standard Pipe Railing
1910.23 Guarding floor and wall openings and holes.

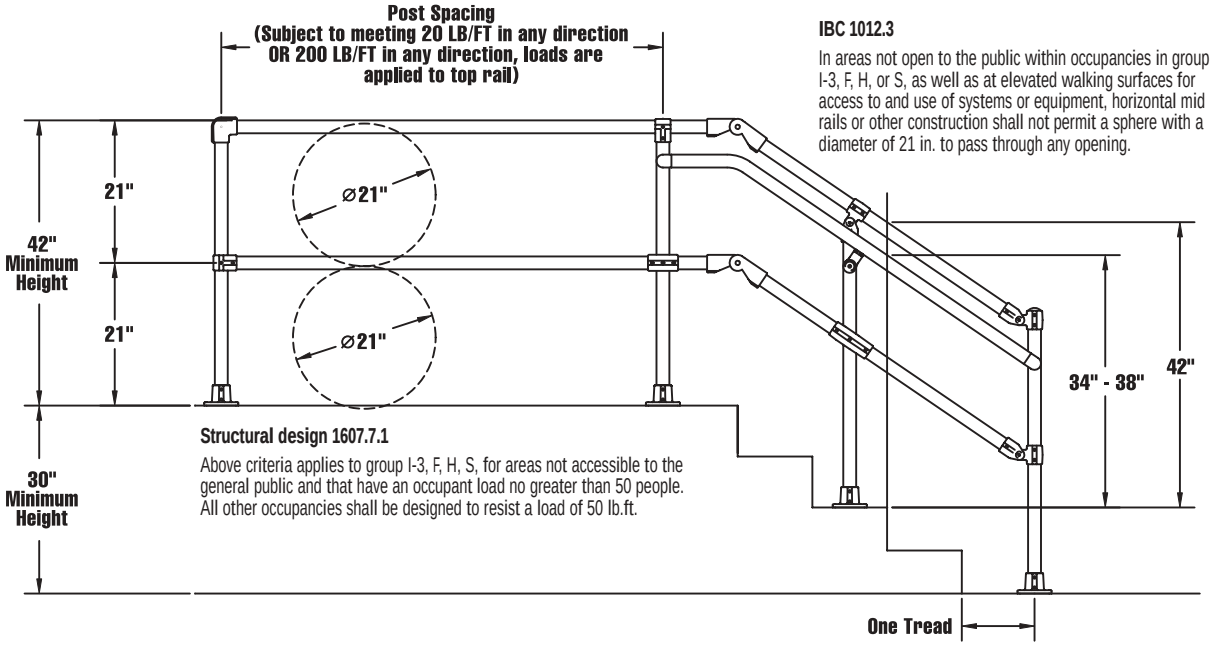


International Building Code - 2003 - Guards
for public access areas.



All codes shown on these pages are interpretations. Be sure to consult local codes, since many use variations of all these codes. The codes themselves change continuously, current data is available on www.intlcode.org and www.access-board.gov.

International Building Code - 2003 - Guards
for areas not open to public access, elevated walking surface.



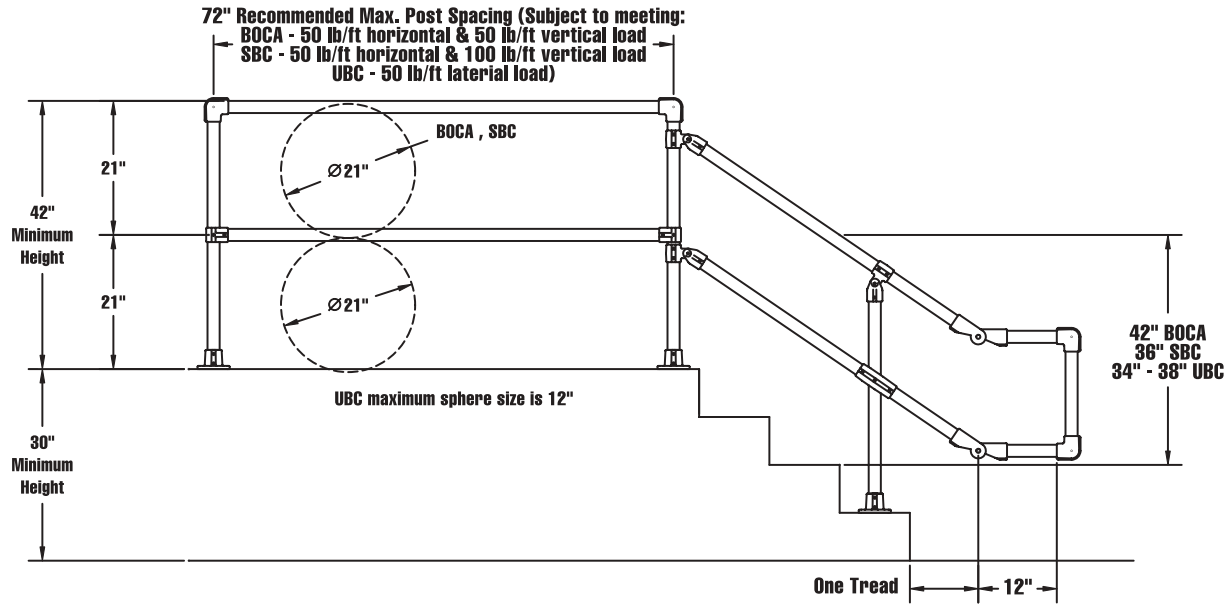
IBC 1012.3

In areas not open to the public within occupancies in group I-3, F, H, or S, as well as at elevated walking surfaces for access to and use of systems or equipment, horizontal mid rails or other construction shall not permit a sphere with a diameter of 21 in. to pass through any opening.

Structural design 1607.7.1

Above criteria applies to group I-3, F, H, S, for areas not accessible to the general public and that have an occupant load no greater than 50 people. All other occupancies shall be designed to resist a load of 50 lb.ft.

BOCA (1999), SBC (1997), UBC (1997) Codes
for areas not open to public access, elevated walking surface.



OPENING LIMITATIONS FOR BOCA/SBC/UBC

BOCA 1021.3 – At elevated walking surfaces for access to and utilization of mechanical and other systems, and in occupancies in Use Groups I-3,F, H-2,H-3, S (other than public garages and open parking structures), and along open sided floor areas located less than 30 in. above the floor or grade below, guards shall have balusters or panels such that a sphere of diameter 21 in. cannot pass through any opening.

SBC: For following sections: Section 1020 Business – 1020.3, Group A, E, R occupancy, Section 1022.4, Factory – Industrial – Group F, Section 1023 – Hazardous, Group H, Section 1024 – Institutional, Group I, Section 1025 – Mercantile, Group M, Section 1027, Storage, Group S – In areas not accessible to the public, guards shall have balusters or panels such that a sphere of diameter 21 in. cannot pass through any opening.

UBC 509.3 – The open space between intermediate rails or ornamental pattern in areas of commercial and industrial- type occupancies which are not accessible to the public may be such that a sphere 12 in. in diameter cannot pass through.

All codes shown on these pages are interpretations. Be sure to consult local codes, since many use variations of all these codes. The codes themselves change continuously, current data is available on www.intlcode.org and www.access-board.gov.

Guardrail & Handrail Structural Design

Table 1 - Mechanical Properties of Pipe

Material	Minimum Tensile Strength (psi)	Minimum Yield Strength (psi)	Allowable Yield Strength* (psi)	Modulus of Elasticity (ksi)
Aluminum 6063-T6 Pipe ASTM429	30,000	25,000	18,000**	10,100
Aluminum 6061-T6 Pipe ASTM429	38,000	35,000	24,000***	10,100
Aluminum 6005-T5 Pipe ASTMB221	38,000	35,000	24,000***	10,100
Carbon Steel Structural Tubing ASTM A500 Grade B	58,000	42,000	30,000	
Carbon Steel Pipe ASTM A53				
Type F Grade B	48,000	30,000	21,600	
Type E Grade B	60,000	35,000	25,000	
Hollaender® Tubular Dowel 6061-T6	38,000	35,000	24,000	10,100

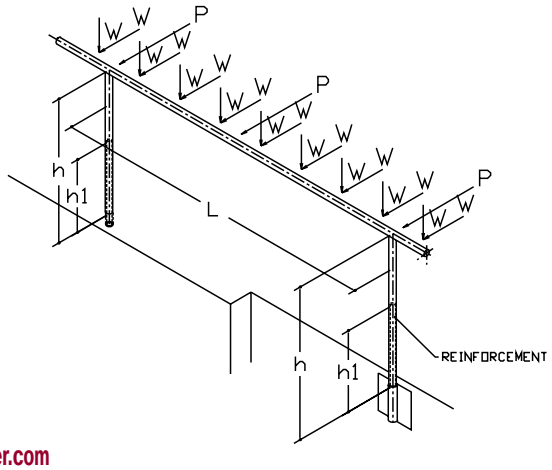
*The allowable yield strength of aluminum pipe in bending is defined by the Aluminum Association to be (1.17 x Minimum Yield Strength) / 1.65.
**Reduce to 8,000 within 1 inch of weld
***Reduce to 14,000 within 1 inch of weld

Table 2 - Section Properties of Pipe and Reinforcing Dowel

Nominal Pipe Size (ips)	OD (in.)	ID (in.)	Wall Thickness	Area ($in.^2$)	I ($in.^4$)	S ($in.^3$)
Schedule 10						
1-1/2"	1.900	1.682	0.109	0.613	0.247	0.260
2"	2.375	2.157	0.109	0.776	0.499	0.420
Schedule 40						
1-1/4"	1.660	1.380	0.140	0.669	0.195	0.235
1-1/2"	1.900	1.610	0.145	0.800	0.310	0.326
2"	2.375	2.067	0.154	1.075	0.666	0.561
Schedule 80						
1-1/4"	1.660	1.278	0.191	0.882	0.242	0.291
1-1/2"	1.900	1.500	0.200	1.068	0.391	0.412
2"	2.375	1.939	0.218	1.477	0.868	0.731
Hollaender Tubular Dowel	1.600	1.250	0.175	0.783	0.201	0.252

Outside Diameter (OD), Inside Diameter (ID), Moment of Inertia (I), Section Modulus (S)

Railing System Dimensions and Loads



Symbols Used in Equations:

w = Uniform loading, (lb/ft).
L = Span between centerlines of posts or mounting brackets, (ft).
P = Concentrated load applied to the top rail, (lb).
h = Height of post from the top of the attachment to the point of load application, (in).
h_1 = Height of reinforcing insert inside post above the top of the attachment, (in).
f_b = Bending stress, (psi).
f_d = Allowable yield strength for design, (psi).
S = Section modulus, (in^3).
S_1 = Combined section modulus of post with reinforcing insert, (in^3).

Calculations for Structural Design

The calculations used here are applicable to free standing straight runs of guardrail with uniform post spacing. The loads applied to a length of guardrail are defined by building codes as either a concentrated load applied to the top rail at any point in any direction, or as a uniformly distributed load per linear foot of rail applied to the top rail either horizontally and/or vertically downward. These two types of loads are not specified to act concurrently. We will illustrate the design of a railing system using separate formulas to calculate the stresses in the posts and the rails respectively. Typically the stress in the posts will be the limiting factor on post spacing, pipe size/schedule, and material.

Post Design

Loads that are applied horizontally at the top rail of a guardrail system produce the maximum bending moment on the posts. The post acts as a vertical cantilevered member in resisting the horizontal load applied to the rails or posts. The height of the rail used in the calculations is measured from the centerline of the top rail to the top of the attachment.

A concentrated load applied to the rail at a post is distributed to the posts on either side of that post. In railing systems where posts and rail are of identical material and section, and where post spacing varies between 3 feet and 6 feet, the greatest proportion of a concentrated load carried by any one post can be estimated as follows:

End posts: 2-span rail – 85%; 3 or more spans – 82%
Intermediate posts: 2-span rail – 65%; 3 or more spans – 60%
In single span railing systems, each post shall be designed to carry the full concentrated load.
These are called the Load Proportion Factors, (P_f).
(A span is defined as the space between posts, 2-span=3 posts, 3-span=4 posts, etc.)

A uniform load is applied to the entire length of rail, and is specified as pounds per linear foot of rail. The load carried by a given post is determined by the load per foot multiplied by the post spacing, or span, in feet. An end post will carry half the load of an intermediate post.

The formulas for post design to calculate the bending stress in the posts are as follows:

Concentrated Load: $f_b = \frac{P \times P_f \times h}{S}$ Uniform Load: $f_b = \frac{w \times L \times h}{S}$

For calculations based on the allowable yield strength of the pipe, the calculated bending stress must be less than or equal to the allowable yield strength of the post material.

Example 1: Concentrated loading condition using a Hollaender #52E-8 side mount flange, with an OSHA concentrated load of 200 pounds, for a 3-span guardrail.

Pipe: 1-1/2" schedule 40; S = 0.326 in^3
Rail height: h = 43 in. (from the centerline of the top rail to the top of the #52E-8 flange)
Post spacing: 6 ft.

Based on the load distribution factors, the design load for an intermediate post is 60% of 200 lb, or 120 lb, and for an end post is 82% of 200 lb, or 164 lb.

The bending stress in the intermediate post is: $f_b = \frac{200 \times .6 \times 43}{.326} = 15{,}828$ psi

The bending stress in the end post is: $f_b = \frac{200 \times .82 \times 43}{.326} = 21{,}631$ psi

The 6063-T6 aluminum pipe, with an allowable yield strength of 18,000 psi is acceptable for the intermediate post but not the end post. We can calculate the bending stress using a schedule 80 end post to see if this is acceptable:

Pipe: 1-1/2" schedule 80; S = 0.412 in^3

The bending stress for the schedule 80 end post is: $f_b = \frac{200 \times .82 \times 43}{.412} = 17{,}116$ psi

This bending stress is less than the allowable yield strength for 6063-T6 aluminum pipe.

Another way to do this would be to calculate for the required section modulus of the post if you had already chosen the type of pipe material you wanted to use by rearranging the formula such as this:

$$S = \frac{P \times P_f \times h}{f_d}$$ where, f_d = the allowable yield strength of the material.

Example 2: Uniform loading condition using a Hollaender® #45SBC-8 base flange with a 3 inch high barrel for the post mounting, and a uniform loading condition of 50 pounds per foot applied horizontally.

Pipe material: 6061-T6 aluminum alloy; f_d = 24,000 psi
Rail height: 38 in. (from the centerline of the top rail to the top of the #45SBC-8 flange)
Post spacing: 6 ft.

There is no load distribution factor for the uniform loading condition. Each intermediate post must take the load per linear foot multiplied by the post spacing in feet.

The required section modulus is: $S = \frac{50 \times 6 \times 38}{24{,}000} = 0.475\ in^3$

This exceeds the section modulus for schedule 80 pipe that is 0.412 in^3. We would either have to shorten the post spacing to 5.2 feet or reinforce the inside of the post with reinforcing dowel to increase the section modulus at the top of the attachment. If this were side mounted rail with a 43 in. height, the post spacing would be reduced to 4.6 feet for a schedule 80 post.

We would choose to use schedule 40 posts that would be reinforced internally with Hollaender® Tubular Dowel made to fit inside a schedule 40 post. The section modulus of schedule 40 pipe and the Hollaender Tubular Dowel would be:

$$S = \frac{\pi(D^4 - d^4)}{32D} = \frac{\pi(1.90^4 - 1.25^4)}{32(1.9)} = 0.547\ in^3$$

This is acceptable because it exceeds the required section modulus of 0.475 in^3 for the #45SBC-8 base flange, and the required section modulus of 0.538 in^3 for a 43 inch rail height using the #52E-8 side mount flange. This will also reduce the cost of the rail since there will be fewer posts by holding the 6 foot post spacing vs. reducing the post spacing to meet the load. Also, the Hollaender Tubular Dowel is 60% lighter than the standard solid aluminum reinforcing dowel that is normally specified, further reducing the cost of the rail. An added benefit of the Hollaender Tubular Dowel over the solid dowel is that a weep hole is not required to let water drain from the post.

The required height of the Hollaender Tubular Dowel inside the schedule 40 post is given by: $h_1 = h - \frac{f_d \times S}{w \times L} = 38 - \frac{24{,}000 \times 0.326}{50 \times 6} = 11.92$ in, say 12 inches.

This is the height of the dowel above the top of the #45SBC-8 base flange, which would make the total length of dowel for this flange to be 15 inches.

For the #52E-8 side mount flange the dowel still has to reach the same height inside the post but it is longer because of the depth of the flange. The reinforcing dowel would be 22 inches long because the flange is 5 inches deep and the top of the flange is 2 inches below the walking surface.

Rail Design

After we have designed the posts, we need to verify that the rail will take the loads specified by the applicable building code. These loads will be the same as specified for the post design, i.e. concentrated or uniform.

A concentrated load applied to the top rail at any point, in any direction creates the maximum bending moment in the rail when applied at the mid-span of the rail between posts. The distribution of loads over multiple spans of rail decreases the maximum bending moment in rails. A bending moment constant (k) is used in the formulas depending on the number of spans in the length of rail. The formula to calculate the bending stress in the rail for concentrated loading at mid-span is as follows:

For single span rail k = 4, for two or more spans k = 5; $f_b = \frac{P \times L}{S \times k}$

Example 3: Concentrated loading condition for a two span length of rail, with an OSHA concentrated load of 200 pounds.

Pipe: 1-1/2" schedule 40, 6063-T6 aluminum; S = 0.326 in^3, f_d = 18,000 psi
Post spacing: 72 in. (L is specified in inches for rail design)
Bending moment constant: k = 5

The bending stress in the rail is: $f_b = \frac{200 \times 72}{0.326 \times 5} = 8{,}834$ psi

The bending stress in the rail is less than the allowable yield strength of 6063-T6 aluminum pipe. If we increase the post spacing to the 8 foot maximum allowed by OSHA, and this was a single span rail, the bending stress in the rail would be 14,723 psi which is still less than the allowable yield strength of 6063-T6 aluminum pipe.

However, even though OSHA allows for a maximum 8 ft. post spacing, all of the model building codes, BOCA, SBC, and UBC for guardrail, specify a uniform load of 50 lb/ft, and require that the loading conditions specified must not exceed the allowable yield strength of the material. Therefore, the post spacing will be limited to the most stringent requirement which are the values determined from the post design calculations for a uniform load.

With a uniform load, the rail load is proportional to the rail span, which has been established by the post design calculation. As in the concentrated load formulas, a bending moment constant is used to allow for the distribution of loads over multiple spans. The formula to calculate the bending stress in the rail for uniform loading is as follows:

For one or two span rail k = 96, for three or more spans k = 114; $f_b = \frac{w \times L^2}{S \times k}$

Example 4: Uniform loading condition of 50 pounds per foot horizontally and 100 pounds per foot vertically downward. This combined load resolves into 111.8 pounds at 63 degrees from horizontal.

Pipe: 1-1/2" schedule 40, 6061-T6 aluminum; S = 0.326 in^3, f_d = 24,000 psi
Post spacing: 72 in.
Bending moment constant: k = 114

The bending stress in the rail is: $f_b = \frac{111.8 \times 72^2}{0.326 \times 114} = 15{,}594$ psi

The bending stress in the rail is less than the allowable yield strength of 6061-T6 aluminum pipe, so the 6 foot post spacing is acceptable with 1-1/2" schedule 40 pipe for the rail.

References

"Pipe Railing Systems Manual, Including Round Tube", third edition, Architectural Metal Products Division of The National Association of Architectural Metal Manufacturers, ANSI/NAAM AMP 521-95, December 19, 1995

"Metal Rail Manual", second edition, 1986, National Ornamental & Miscellaneous Metal Association.

Hollaender

Notes

Quality with Ease

The Hollaender® Manufacturing Company

- Proven performance for over 60 years
- Single source for all handrail and fitting needs
- Technologically advanced manufacturer, CAD/CAM & CNC
- World-class engineering group
- State-of-the-art aluminum foundry
- New product innovator

Hollaender
Your Handrail Source.

The Hollaender®
Manufacturing Company

10285 Wayne Avenue
P.O. Box 156399
Cincinnati, OH 45215-6399

Phone: (513) 772-8800
Toll Free Phone: (800) 772-8800

Fax: (513) 772-8806
Toll Free Fax: (800) 772-8806

Web: www.hollaender.com
E-Mail: sales@hollaender.com